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ABSTRACT

A study, growing out of human capital theory, examined the economic consequences of dropping out of high school. Effect of schooling over time on labor market success (hourly pay rate, occupational prestige, and employment incidence and duration) was measured. Data on young men and women was obtained from the National Longitudinal Surveys of Labor Market Experience and personal interviews. The study universe consisted of respondents who left school between 1958-70 (males) and 1960-72 (females), completed nine-to-twelve years of schooling, and were not enrolled at the time of the survey. A three-equation recursive model was used to determine schooling contribution to success measures. Findings demonstrated substantial labor market benefits for all groups during the first decade of labor market experience. Earnings differences between graduates and dropouts were not pronounced immediately upon leaving school, but became significant over time. Graduates' age-earnings profiles were steeper than those of dropouts. The difference in occupational status between black graduates and dropouts shrank over time. All graduates, except black females, enjoyed greater immunity to unemployment than dropouts. In employment duration the advantage of black males and black and white females deteriorated over time; little difference was demonstrated between white male graduates and dropouts. (CSS)

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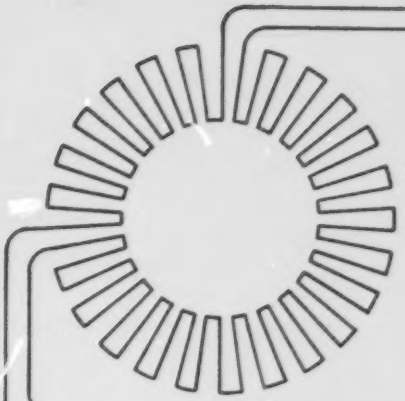

Center for Human Resource Research

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THE LABOR MARKET CONSEQUENCES OF

DROPPING OUT OF HIGH SCHOOL

by

Randall Howard King

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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CHAPTER I

INTRODUCTION

The labor market problems of high school dropouts are well known--higher unemployment rates, lower earnings, and a less favorable occupational distribution as compared to high school graduates (Tables 2-4). It is perhaps more surprising that a relatively large number of young people continue to leave school without a diploma--over ten percent of whites and more than eighteen percent of blacks (Table 1)--despite the considerable money spent on stay-in-school campaigns.

Although the figures in Tables 1-4 are illuminating from a descriptive point of view, their gross nature precludes their use in determining whether or not the lack of schooling actually causes the below average labor market performance of dropouts. That is, graduates may achieve a larger degree of labor market success not only because of more schooling, but part or all of their success may also be due to more favorable personal and/or environmental factors that are related both to the likelihood of obtaining schooling and success. There has been one previous study [Bachman et al. (1971)] that analyzed the dropout-graduate earnings differential in a multivariate framework. Those researchers concluded that dropping out was over-rated as a problem in its own right--it was merely a symptom of more

Table 1: Percent of Population Who Have Left School Without a High School Diploma (1975) by Race and Sex: Individuals 14-24 Years of Age

Race and sex	Percent without diploma
White males	9.9
Black males	18.1
White females	11.0
Black females	18.9

Source: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics. The Condition of Education, 1977 edition. Vol. 3, Pt. 1, p. 197, table 4.12.

Table 2: Unemployment Rates, March 1976, by High School Completion Status: Individuals 18-24 Years of Age

Years of high school completed	Unemployment rate
Less than 4	24.4
4	14.8

Source: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics. The Condition of Education, 1977 edition. Vol. 3, Pt. 1, p. 221, table 5.17.

Table 3: Median Total Money Income in 1975 by High School Completion Status and Sex: Individuals 18-24 Years of Age (Year Round Full-Time Workers)

Sex and years of high school completed	Median income
Males	
Less than 4	$7,210
4	$8,134
Females	
Less than 4	$5,080
4	$5,998

Source: U.S. Department of Commerce, Bureau of the Census. Current Population Reports, Consumer Income, Series P-60, No. 105, 1977, table 47.

Table 4: Occupation of Employed High School Graduates and Dropouts, October 1976, by Race: Individuals 16-24 Years of Age (percentage distributions)

Occupation	Graduates		Dropouts	
	Whites	Blacks and others	Whites	Blacks and others
Total	100	100	100	100
White-collar workers	48.4	42.2	13.2	10.2
Professional and technical	10.7	8.8	1.0	1.7
Managerial	5.1	1.7	2.0	.9
Sales	6.3	4.3	3.7	.9
Clerical	26.3	27.4	6.5	6.7
Blue-collar workers	36.0	37.3	63.9	52.5
Craft	12.2	5.5	16.6	8.4
Operatives	13.0	19.2	26.6	22.3
Transportation workers	3.4	3.5	5.8	6.7
Laborers (except farm and mine)	7.4	9.1	14.9	15.1
Service	12.8	18.9	17.3	29.6
Private household workers	.7	1.3	1.3	3.8
Other	12.1	17.6	16.0	25.8
Farm	2.3	1.4	5.6	7.8

Source: Young, A.M. "Students, Graduates, and Dropouts in the Labor Market, October 1976." Monthly Labor Review, Vol. 100, No. 7 (July 1977), p. 42.

basic problems. That study, however, was plagued by extremely small sample sizes, a short time frame, and crude controls for work experience.[1]

The purpose of this study is to present further evidence on the economic consequences (if any) of dropping out of high school. The effect of schooling over time on four measures of labor market success is investigated: hourly rate of pay, occupational prestige, and the incidence and duration of unemployment. While these measures of labor market success are obviously not exhaustive of the economic returns to a high school education, they do provide more dimensions than are typical of "economics-of-education" studies.[2]

In addition to presenting four criteria of labor market success, this study goes substantially beyond what has been done in the vast literature on the economic returns to schooling. First, a national probability sample of white and black respondents of both sexes (the National Longitudinal Surveys) provide the data for the analysis. These data allow for broader generalization of the results than most previous studies, and permit interracial and intersex comparisons.

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[1]The consequences of dropping out of high school were not the major focus of the Bachman study. That study primarily addressed the correlates of early school withdrawal.

[2]Perhaps the most serious omission in this study is the impossibility of explicitly considering the option to attend college that exists for high school graduates [see, for example, Weisbrod (1962)]. In addition, because this study focuses on the labor market returns to schooling, any "consumption" value related to schooling is also ignored.

Second, a host of personal and environmental variables is used to control for differences in the characteristics of graduates and dropouts, and thus to allow unbiased estimates of the effect of years of schooling on labor market success.

Finally, a three-equation recursive structure is employed to determine not only the direct effect of schooling on success, but also schooling's indirect effects. In addition to the success measures themselves, the model used in this study treats the receipt of post-school training and length of job tenure as endogenous variables. Conventional analyses of the economic returns to schooling "hold constant" training and tenure, which understates the contribution of education to success if years of schooling are associated positively with training and tenure and the latter variables bear a positive relationship to success.

The policy implications of this study are significant. Not only is the educational decision the most fundamental human capital choice an individual makes, but educational outlays are one of the largest expenditures in the public sector. For individuals to evaluate effectively the economic payoff to schooling, the consequences of terminating this investment must be more fully understood. Indeed, it is possible that the "stay-in-school" campaigns actually misguide individuals by overstating the labor market advantages of a high school diploma. Similarly, this information is vital to policy makers concerned with promoting human resource formation. Of special interest to policy makers

is the source of the labor market advantages (if any) associated with completion of high school. For example, if the findings of this study suggest that schooling per se (i.e., the direct effect of schooling) has a minimal impact on the success measures, while post-school training and length of job tenure (i.e., schooling's indirect effects) have relatively large impacts, then human resource policy may be more effective if directed toward encouraging individuals to receive training and/or by encouraging greater job tenure by making individuals more attractive to employers. On the theoretical level, the results provide an additional assessment of human capital theory as an explanation of success in the labor market, as part of the more general question of explaining the growth and distribution of income over time.

Plan of the Study

The next chapter presents a discussion of the conceptual framework underlying human capital analysis, including the research questions addressed in this study and a review of the literature on the economic returns to schooling. Chapter III describes the research design of the study, including the data source, variables, and the model employed. The empirical results are presented in Chapter IV. The final chapter presents the summary and conclusions.

CHAPTER II

CONCEPTUAL FRAMEWORK

Human Capital Theory[1]

The research questions addressed in this study flow out of human capital theory, which is the behavioral model underlying most economic analyses of investment in schooling. This theory--developed by Schultz, Becker, Mincer, and others in the early 1960's--postulates that individuals attempt to maximize the net present value of future earnings by investing in themselves (e.g., schooling, institutional and on-the-job training, health maintenance, etc.). An individual's net earnings at age t (E_t) equal the earnings he or she would have had at time t in the absence of investment (X_t) plus the total returns on earlier human capital investment (K_t) minus the cost of investment at the time t (C_t). Thus,

$$E_t = X_t + K_t - C_t.$$

The total return depends on the amount invested as well as the rate of return. Differences in the total amounts invested by different persons are related to differences in the rate of return available and in the cost of investment funds.

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[1]Much of this section, including the first diagram, is taken from Becker (1975).

Figure 1 shows why human capital investments differ among individuals. The demand curve in the figure is the marginal rate of return on the human capital investment. The rate of return depends on the time series of marginal returns and the marginal "production cost" (i.e., foregone earnings and direct expenditures) of investment. The supply curve in Figure 1 shows the marginal costs of financing the investment, as measured by the marginal cost of investment funds that the individual faces.[2] The equilibrium is found at the intersection of the demand and supply curve, or, where the marginal rate of return equals the marginal cost of investment. At this point net earnings are maximized (i.e., OD units of human capital investment in Figure 1, if the individual faces $Demand_1$).

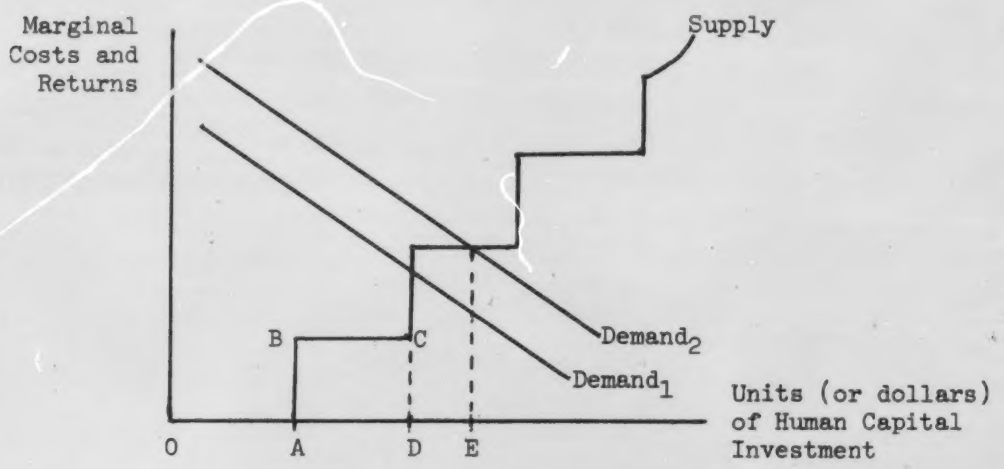

Figure 1: Supply and Demand Curves for Investment in Human Capital

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[2]The slopes, shapes, and relative positions of the demand and supply curves are discussed in detail in Becker (1975).

In the absence of personal and environmental differences among individuals, everyone would face the same supply and demand curves and each rational person would invest in the same amount of human capital. In fact, however, individuals face different supply and demand conditions--those with lower supply or higher demand curves invest in more human capital than others.[3] Because the demand curve represents the rate of return to investment, its height is a function of individual "capacities" (e.g., ability, health condition, motivation, etc.).[4] The supply curve, which shows the marginal cost of financing a given level of investment, is a function of the individual's "opportunities" for financing. The "opportunity" factors can be measured by the interest rate for investment funds that the

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[3] If the individual's demand curve is represented by $Demand_2$, OE units of human capital would be "purchased."

[4] Hause (1972) has shown that number of years of schooling and ability have a significant complementarity with earnings. That is, higher ability persons are better able to convert a unit of education into higher earnings. If this were not the case, individuals with higher ability would be observed completing fewer years of schooling than those with lower ability--however, this result would conflict with the empirical evidence showing a positive relationship between measured ability and years of school completed. Hause makes his point in the following way: Suppose that earnings (Y) were a function of ability (A) and schooling (S)--

$$Y=f(A)+g(S)$$ [we assume that $dY/dA > 0$ and $dY/dS > 0$].

In this form the marginal product of schooling, dg/dS, is independent of ability. This result is not plausible because it implies that people with low ability have a greater incentive to invest in schooling because the increase in earnings from an increment of schooling is the same for all, regardless of ability, but the foregone earnings are greater for the higher-ability persons. Thus, this argument implies that the earnings function is misspecified unless ability increases the marginal product of schooling rapidly enough to more than offset the rise in opportunity cost associated with higher ability [Hause (1972) p. S111].

individual faces, as well as a measure of the individual's ability to finance the opportunity costs.[5] If the market for human capital investment funds were not segmented due to special subsidies, legal restrictions on lending or borrowing, etc., the supply curve would be a smooth upward sloping curve because of the increased difficulty in financing additional investment. In fact, however, the actual market for human capital funds is highly segmented, as reflected in the hypothetical supply curve in Figure 1.

Investment in High School

In the specific case of investment in high school, a more accurate representation of the human capital market is illustrated by Figure 2. Figure 2 differs from Figure 1 in that the supply schedule (i.e., the marginal cost of investment) in Figure 2 is a smooth, upward sloping curve because the marginal cost of investment of this level of schooling is a function of the student's ability to finance the foregone earnings--no direct costs are involved.[6] The demand curves in Figure 2 are similar to those in the first diagram. Thus, persons with higher demand curves (i.e., greater capacities) or lower supply curves (i.e., greater opportunities) invest in more years of schooling than do others.

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[5]The latter distinction is drawn by Solmon (1970).

[6]Of course, there are direct costs for investment in a private high school education. Thus, the supply curve may be segmented in this case.

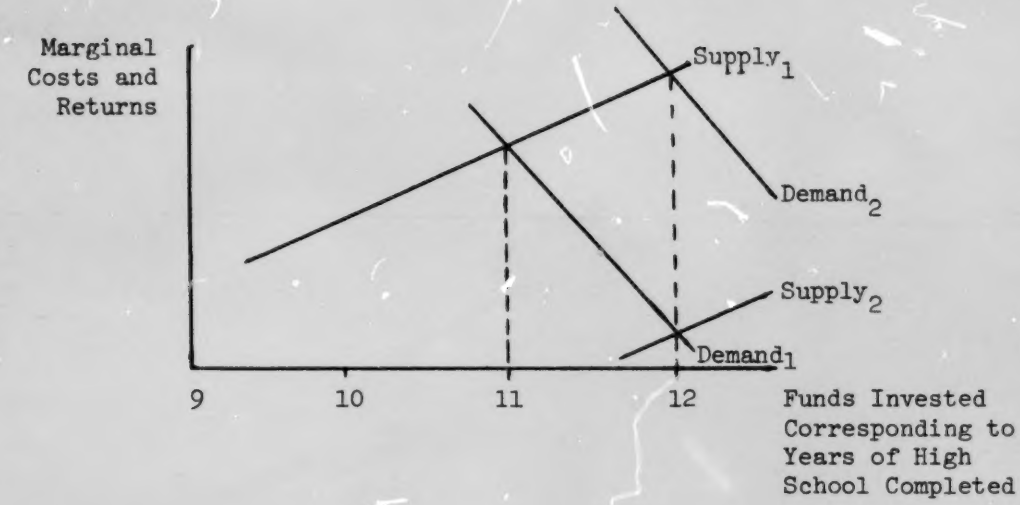

Figure 2: Supply and Demand Curves for Investment in High School

From the foregoing, it is clear that individuals completing more years of schooling than others are likely to have greater capacities and/or greater opportunities for investment. Thus, it is necessary to hold constant those factors when evaluating the economic effects of schooling on labor market success. In this study a measure of ability is used to control for differential capacities, along with other personal and environmental characteristics. A measure of parental socioeconomic status controls for differences in opportunities for investment.[7] Without controls for capacity and opportunity factors, returns attributed to schooling may be due to interpersonal differences in capacities and/or opportunities, biasing the schooling coefficient.

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[7]The full set of variables employed in the analysis is discussed in Chapter III.

The "Ability Bias"

The relative bias introduced in the schooling coefficient when a measure of ability is left out of the earnings equation is a matter of some controversy. The classic stance of human capital theorists was that background influences were relatively unimportant because of the overriding influence of the duration of schooling.[8] Nevertheless, it was clear that the well-known positive association between ability and schooling on the one hand and schooling and wages on the other suggested a bias in the earnings equation if a measure of ability were not included. Although measures of ability were not generally available to investigators prior to the 1970's, some researchers followed Denison by arbitrarily attributing only two-thirds of the calculated schooling effect to education and the remaining one-third to genetic and social factors.

When proxy variables for ability became generally available, much effort went into actual calculation of the effect of the "ability bias" on the calculated returns from schooling. While there is a wide range of reductions in measured returns from schooling that follow corrections for ability, none of the estimates show a zero net return to schooling, which would cast serious doubt on the validity of human capital theory.[9]

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[8]Blaug (1976).

[9]Welch (1975).

The following is a summary of the findings regarding the ability bias, as reported in an excellent survey article by Welch (1975): Gintis summarized nine different studies, finding that the inclusion of an ability measure reduced the schooling coefficient from 4 to 35 percent (the central tendency appeared to be about 10 percent). Hanushek found that the average schooling coefficient was reduced about 15 percent when a measure of ability was included. Taubman and Wales reported a 9 percent reduction in the schooling coefficient when a measure of general ability was included and a reduction of 30 to 35 percent when mathematical ability was controlled. Griliches and Mason used two measures of ability--one was observed at an intermediate point in the schooling career, and one was measured after all schooling was completed. Inclusion of the former measure reduced the schooling coefficient from 7 to 10 percent, while the latter measure reduced schooling's contribution to earnings by 13 to 17 percent.

It is clear from the foregoing that controlling for ability in earnings equations does reduce the calculated schooling coefficient. However, in virtually all studies the return to schooling remains significantly positive. Thus, the general consensus among economists is that the ability bias is reasonably low. Griliches (1977) argues that high estimates of the ability bias are due to the interrelationship of ability with other commonly omitted variables such as school quality, motivation, etc. Other researchers [such as Cardell and Hopkins (1974)] explain low estimates of the ability bias as the result of the use of erroneous measures of ability [see Griliches (1977)].

However, in a world of measurement error, there are pitfalls in controlling for "too much" in earnings equations [see Welch (1975) and Griliches (1977)]. That is, by adding more and more variables into the earnings function in order to control for possible biases, the problem of measurement error gets more serious. This error is potentially more damaging than the original problem of the ability bias. As summarized by Griliches (1977):

> Most of the discussion. . .has been asymmetric. It has focused our thinking about potential upward biases in the estimated [schooling coefficient] and trying to guard against them by adding "ability" or other types of variables (such as "background") to the original earnings function. But excessive zeal can easily result in serious downward biases in our estimated [schooling coefficients]. This is particularly true if, as is most often the case, our measures of schooling are far from perfect, and especially if they too are subject to random errors of measurement (p. 12).

In any case, a measure of ability is used in this study to minimize the possibility of the ability bias. However, the measure used is certainly not perfect, and the possible omission of other relevant variables must also be acknowledged. For example, measures of "motivation" and school quality are not included. To the extent that the effects of these variables are not picked up in the variables (other than schooling) included in the model, the calculated effect of schooling on labor market success may be overstated.

Training

There is evidence that formal schooling is complementary to another form of human capital investment--investment in post-school

training. Two types of post-school training can be identified; formal institutional training programs, and formal or informal on-the-job training.

With regard to the former, increased educational attainment may be expected to increase the probability of receiving training for two reasons. First, graduation from high school may itself open avenues of training that are closed to dropouts. That is, a high school diploma is a necessary credential for acceptance into some training programs. Second, the returns to training have been shown to be related positively to schooling. Kruse (1976) found that the payoff to post-school training programs for a group of young men was significantly related to the amount of schooling that the men had completed prior to receiving training. For example, the payoff to an additional month of training had over three times the value for high school graduates than for dropouts. Thus, schooling not only enhances an individual's productivity in market work, but it also makes him or her more efficient in other activities as well.[10] Kruse concluded by stating that his results ". . .provide strong support for the hypothesis that schooling enables an individual to take advantage of more valuable post-school investment activity. Weisbrod's notion of the option value of education is thus reinforced and should be considered in any cost-benefit analysis of educational policy (pp. 16-17)." Thus, failure to consider the schooling-training relationship will understate the "true" returns to education.

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[10]Kruse (1976).

Rosen (1972) views on-the-job training as an implicit market for learning opportunities: "In effect, employers attempt to sell training services as a way of inducing people to work for them and, of course, the price of such services is a lower initial wage (p. 333)." An implication of Rosen's analysis is that workers progress through a "hierarchy" of jobs with lesser learning content (and higher wages) over time. In addition, Rosen makes the point that graduates are more likely than dropouts to be accepted into jobs that promise longer-term training and later payoffs:

> There is no reason to expect individuals at any given level of schooling to possess equal capacity for learning, for some workers are more "able" than others. Furthermore, differences in [on-the-job training] may be systematically associated with differences in formal schooling. School not only gives students higher skill at the time of entry into the labor force, but may also increase their ability to learn (p. 337).

Thus, high school graduates are more likely than dropouts to have invested in both types of post-school training activities. Since formal schooling is related positively to institutional and on-the-job training, these investments are treated as endogenous variables in the analysis.

Cyclical Fluctuations in the Return to Schooling

From work done by Walter Oi (1962), one would expect the return to schooling to be sensitive to the labor market conditions in the year in which the cross-section is taken. Oi proposed a theory of employment which rested on the notion that labor is a quasi-fixed factor of production. The fixed employment costs of labor arise

from investments by firms in hiring and training activities. Workers who have been invested in more heavily by the firm are less likely to be let go during a downturn in economic activity, and their wages will be more invariant to cyclical fluctuations in demand than other workers:

> Firms may invest in hiring--to acquire particular workers--or in specific training to improve labor's productivity. The periodic rent, representing the amortization of these fixed employment costs, drives a wedge between the marginal value product and the wage rate. The relative magnitude of this wedge, measured by the degree of fixity, differs among occupations or grades of labor. In a sense, the periodic rent forms a buffer absorbing short run variations in a factor's marginal value product. Thus, short run changes in product demands lead to differential shifts in factor demands, depending on the degree of fixity. Factors with lower degrees of fixity will experience relatively greater shifts in demand as the result of any given short run change in product demand. . . .This would predict a widening of [occupational] wage differentials in a downswing and a narrowing in the upswing (p. 543).

Thus, high school graduates (who are likely to be more heavily invested in by the firm than dropouts) are again shown to be likely to have accumulated greater job tenure (and less unemployment) than dropouts, as well as having wage rates that are less affected by the prevailing economic conditions. Therefore, observation of relative wages (as between graduates and dropouts) at a given point in time will likely be influenced by the state of the economy at that time. For that reason, schooling's effect on wages for the young men will be investigated at two points in time--when the labor market is relatively loose (1971) and when it is relatively tight (1968).

The "Screening Effect"

The concept of screening (or "credentalism") rests on the premise that individuals and employers have imperfect information. Since employers cannot initially observe "ability," a credential (e.g., a high school diploma) may be viewed by employers as indicating "trainability." To the extent that this occurs, years of schooling may be important as a screening device rather than as a producer of cognitive job skills.[11]

Unfortunately, the screening effect cannot be rigorously tested without actually observing the schooling process to see if skills are learned or if successful completion of schooling merely identifies personal characteristics that employers are seeking (e.g., motivation, ability, docility, etc.). From the viewpoint of the individual, the difference is academic; those with higher levels of schooling are more likely to be employed at higher wages. However, from the viewpoint of public policy the difference is significant. If schooling is only a screening device, educational expansion is unlikely to have much impact on earnings because an increased flow of graduates will simply promote upgrading of hiring standards.[12] Although (as previously mentioned) a direct test of credentialism is impossible, this study presents some indirect evidence regarding that hypothesis by comparing the returns from years of schooling with the returns from completion of high school.

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[11]The latter view is that expressed by human capital theorists.

[12]See Blaug (1976).

Research Questions Addressed in this Study

This study focuses on the following research questions:

1. To what extent do high school graduates enjoy higher wages, greater occupational prestige, and less unemployment than high school dropouts during the first thirteen years of exposure to the labor market?
2. What is the source of the labor market advantages (or disadvantages) for graduates? Is it the additional schooling per se that leads to greater success, or is the high school diploma also associated with substantial indirect effects on success through the increased likelihood of post-school training and/or increased job tenure that graduates typically possess?
3. Does the state of the labor market at the time of the analysis have any influence on measured wage differentials between male graduates and dropouts?
4. Can any indirect evidence be gleaned regarding the "screening hypothesis?"
5. Are there intersex or interracial differences in 1-4 above?

Literature Review

There are two lines of related research bearing on the question of the returns to schooling. Economists have performed literally hundreds of "rate-return-to-education" studies, and a variety of researchers have estimated multivariate "wage-functions."

Rate-of-Return Analysis

This type of analysis requires data on the private costs of completing a given year of schooling and an estimate of the discounted value of the expected future earnings stream attributable to completing that year. Estimates of the private returns to schooling are based on age-earnings profiles that are typical of individuals who have completed different levels of schooling. Because the direct individual cost of completing an additional year of high school is usually zero, estimates of foregone earnings (i.e., the earnings that an individual could have received had he or she performed market work instead of attending school) represent the cost measure. The internal rate of return is that interest rate which equates the present values of the financial returns and the costs of that level of schooling. Thus, differences in earnings associated with different levels of schooling are attributed to investment in education.

Conceptually, the rate-of-return approach is very appealing as a guide to individual decision making as well as to public policy. In contrast to "earnings functions," the rate-of-return calculations take explicit account of the costs incurred in attaining higher levels of education.[13] However, one must be particularly careful when interpreting internal rates of return because of the severe limitations inherent in such calculations. The first problem

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[13]Under a set of rigorous assumptions, the coefficient of schooling in a log-earnings function can be considered as a rate of return (i.e., the costs of investment are considered). See Becker and Chiswick (1966).

concerns the estimate of foregone earnings. As Parsons (1974) shows, ". . .foregone earnings are not identical to schooling time costs, since students will sacrifice leisure as well as earnings (p. 251)." Thus, foregone earnings understate schooling costs; hence, calculated rates of return are overstated.

In addition, a number of limitations confront the researcher on the returns side of the calculation. First, the inputs for the age-earnings profiles are generally obtained from decennial census data, which provide distributions of income by age and level of schooling. With some adjustments--usually for taxes and mortality, but not for individual characteristics--these observations are assumed to represent the expected future income histories of the individuals. However, it is impossible to make reliable estimates of the financial returns to education on the basis of census data. The most serious problem is the bias introduced into earnings equations when such variables as ability, health, family socioeconomic status, and work experience are not included (i.e., the "omitted-variable" problem). That is, the return associated with additional schooling reflects not only the effects of the education itself, but also the effects of variables related both to schooling and earnings that are not included in the earnings function, causing artificially high calculated rates of returns. This limitation is generally recognized by authors of rate-of-return studies, but it is impossible to control for those effects when using cross-section census data. Indeed, some investigators have followed Denison by arbitrarily

attributing only two-thirds of the calculated schooling effect to education and the remaining one-third to genetic and social factors.[14]

Another limitation of rate-of-return studies stems from the fact that they are based upon annual income data. This measure distorts upwardly the "true" return to education because the number of years of school completed is associated positively with hours of work and with non-labor income. Thus, it is necessary to hold constant labor supply decisions and non-earned income when calculating a rate of return [see Lindsay (1971), Eckaus (1973), and Kohen (1973)]. In addition, annual earnings are dependent on unemployment experience as well as voluntary labor supply decisions. In this study, hourly earnings are used as the measure of monetary success, circumventing the problem of annual income measures, and unemployment experience is analyzed separately.

In the following review of six well-known rate-of-return-to-education studies, only the calculated rates of return that are relevant to the present study are presented. The results, summarized in Table 5, differ primarily because of varying samples and controls.

Hansen (1963), using 1950 census data, calculated a before-tax rate of return of 18.6 percent for a male completing twelve years of schooling as compared with eleven years. When he adjusted for taxes, the private rate of return for this group fell just over one percentage point (to 17.5 percent). Hanoch (1967) estimated a rate of return to high school graduation (over 9-11 years of schooling) for white and

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[14]See the discussion on pp. 13-15.

Table 5: Summary of Selected Rate-of-Return-to-Education Studies[a]

Educational Comparison	Rate of Return	Race-Sex Cohort	Sample	Variables Controlled
Hansen (1963)				
12/11	18.6 (before tax) 17.5 (after tax)	Males	1950 census	mortality, taxes
Hanoch (1967)				
12/9-11	16.0 18.8 22.0 12.0	Northern White Males Southern White Males Northern Nonwhite Males Southern Nonwhite Males	1960 census	size and place of residence, hours worked, marital status, family size, region of birth, mobility, age
Hines, Tweeten, Redfern (1970)				
12/9-11	14.5 24.6 56.2 32.8	White Males Other Males White Females Other Females	1960 census	none
Eckaus (1973)				
12/9-11	5.0	White Males in specified occupations	1960 census	mortality, taxes. Standardized to 2,000 hours worked per year.
Becker (1975)				
12/8	16 20 25 28	White Males	1940 census 1950 census 1956 CPS 1958 CPS	taxes
Carnoy and Marenbach (1975)				
12/8	14.0 19.9 15.1 19.1	White Males Black Males White Females Black Females	1970 census	Male rates adjusted for federal taxes. Rates based on earnings rather than income.

a Only selected rates of return are shown here.

nonwhite males in the North and South. He ran linear regressions (using 1960 census data) to control for size and place of residence, hours worked, marital status, family size, region of birth, mortality, and age. He found a rate of return of 16.0 percent for Northern white graduates as compared with 18.8 percent for Southern white graduates. The comparable figures for blacks were 22.0 and 12 percent. Another study using 1960 census data is that of Hines, Tweeten, and Redfern (1970). Rates of return to females, as well as to males, were calculated. The rates of return to completing high school (over 9-11 years) were 14.5 percent and 56.2 percent for white males and females, respectively, and 24.6 and 32.8 percent for nonwhite males and females.

Eckaus (1973) also used 1960 census data and calculated a rate of return after standardizing income for full-time, full-year employment, taxes, and mortality. The income standardization process led him to calculate a rate of return of only 5 percent for white male graduates in specified occupations as compared with those who completed only 9-11 years. Becker (1975) calculated the secular rate of return to white male high school graduates (compared with elementary school graduates) using census and Current Population Survey data. After adjusting for taxes he found that 1939 graduates received a 16 percent return on their schooling investment, 1949 graduates earned 20 percent, 1956 completers had a 25 percent return, and those finishing school in 1958 enjoyed a 28 percent internal rate of return. Carnoy and Marenbach (1975) used 1970 census data

and calculated a rate of return to white and black male and female graduates (completion of 12 years over 8 years). The results, based on an estimate of earnings rather than income and after controlling for federal taxes were 14.0, 19.9, 15.1, and 19.1 percent, respectively.

The overall conclusion from the rate-of-return studies is that high school graduation is a profitable investment. The lowest internal rate of return calculated was 5 percent, while most estimates were in the 10-20 percent range. Despite the aforementioned limitations inherent in this type of analysis, a rate of return to high school graduation is calculated for the four race-sex cohorts in this study. These results are presented and discussed in Chapter IV.

Other Studies

Other approaches that have frequently been used to estimate the advantage accruing to schooling are "wage-function" studies and similar analyses. These types of analyses typically regress one or more success measures (e.g., wages, unemployment experience, etc.) on a variety of variables that are hypothesized to be related to success, including schooling. The advantage of this approach is that measures of personal and/or environmental characteristics can be included as control variables, yielding more reliable estimates of the net effect of schooling on success. Of course, the "wage-function" approach is not necessarily distinct from the "rate-of-return" approach; rates of return can be calculated from wage

functions, as is done in this study. Indeed, a wage function can provide a "refined" rate of return to schooling because of the possibility of controlling for measures of personal and environmental characteristics.

However, there are two primary disadvantages of wage-function studies. First, the researcher needs access to a large microdata set, rather than the more easily obtainable census data. Second, information regarding the sample must be available for a reasonably long period of time (i.e., to include several years of post-school labor market experience for each individual or to have a large sample of persons of different ages) in order to allow reliable estimates of the role of schooling in a long-run labor market perspective. For example, there are occupational differences in returns to investment in education. That is, observed differences in age-income profiles may in part be due to differences in post school human capital investments related to occupations (i.e., individuals may invest different amounts in on-the-job training by occupation). Since the individual at least partly finances such investment in return for a future payoff [see Becker (1975)], age-income profiles may diverge <u>for a given level of schooling</u>. Mincer (1974) has estimated that these various age-income profiles will in fact intersect after about 6-9 years in the labor market (i.e., the "overtaking point"). At this point, the effect of education on earnings is at a maximum. Because the present study explores labor market success for a thirteen-year period, this distortion is

minimized, allowing for more reliable estimates of the role of schooling.

While there have been a large number of wage-function studies that have included schooling as an independent variable, very few of these have produced direct evidence on the labor market consequences of dropping out of high school. First, schooling has usually been included only as a continuous variable, forcing returns to be equal for every year completed. In addition, because most studies have included individuals who have attended college, they have not made it possible to get a precise estimate of the labor market effects of completing high school relative to dropping out.

However, Bachman et al. (1971) used a multivariate approach to ascertain the causes and consequences of dropping out of high school. That study was based on a longitudinal analysis of 2,213 boys who were in the tenth grade in 1966. At the time of the study's publication, the group had been followed for four years.

The strength of the Bachman study is the analysis of the correlates of school completion. Three groups were identified: individuals who dropped out before high school graduation (group 1); persons who received a high school diploma, but did not attend college (group 2); and those who entered college (group 3). The three groups were compared along a number of dimensions, including (among others): family background, intelligence and verbal skills, attitudes toward school, social values, self-esteem, delinquent behavior, and occupational attitudes and aspirations. While the

differences among the three groups along those dimensions were in the expected direction (i.e., the mean scores for group 1 and group 3 respondents were at the ends of the scale and group 2 was in the middle), unfortunately Bachman and his associates did not publish the statistical significance levels of the differences. However, the mean differences between group 1 (high school dropouts) and group 2 (high school graduates) were not very large; the larger differences were between groups 1 and 3 and between groups 2 and 3. For example, with respect to IQ Bachman et al. concluded:

> It is no surprise to find that those boys who later became dropouts tended to score below average on tests of intelligence and academic ability that were administered at the start of the study. What may be surprising is that the differences are really not very large (about the equivalent of five IQ points, on the average) between dropouts and those stayins who did not go on to college. The much larger differences appear between those boys who later went to college and all those who did not (pp. 171-2).

Since the present study does not have available as extensive an array of personal, environmental, and social characteristics of the sample to use as control variables, Bachman's finding of relatively small differences in these respects between dropouts and graduates is comforting. To reiterate one of the conclusions of the Bachman study: ". . .in most respects dropouts are not so very different from those who end their education with high school graduation; it is more often the ones who go to college who really stand apart (p. 174)." Moreover, Bachman found that, on average, those who dropped out of high school could have completed this level of

schooling if they had chosen to; the average high school grade received by dropouts was a "C," as compared with an average grade of "C+" for high school graduates.[15] In the light of all this, it is unlikely that the present study will suffer from seriously biased schooling coefficients due to omitted variables.

The small portion of the Bachman study that dealt with the consequences of dropping out of high school led those researchers to conclude that male high school graduates did not fare substantially better in the labor market than dropouts. In that study, graduates and dropouts were compared along four dimensions of labor market success: rates of employment, income, job status, and job satisfaction. With regard to the first criterion measure, Bachman and his associates found that dropouts were substantially less likely than graduates to have been employed 30 or more hours a week (71 percent versus 87 percent). The remainder of the analysis was confined to the 62 dropouts and 379 graduates who had been employed full-time (i.e., those who had been employed 30+ hours a week). Before comparing the weekly income levels of the two groups, the sample was stratified by five categories of labor market exposure because graduates had been out of school for at most two years when the data were collected in 1970, while dropouts had had up to four years of experience. However, this stratification reduced the number of sample cases to less than 15 dropouts per cell. Nevertheless, the

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[15] Bachman et al. (1971).

income analysis was carried out, and the conclusion was that there was very little difference between the two groups (what difference there was tended to favor the dropouts). The findings regarding the remaining two success variables were mixed; graduates had mean Duncan index[16] scores that were about 15 percent higher than those of the dropouts, while dropouts appeared to be more satisfied with their jobs than were graduates.

Thus, Bachman and his associates concluded that the lack of a high school diploma did not appear to hinder the labor market achievements of dropouts. However, as the previous paragraph has indicated, this portion of the Bachman study suffered from several major limitations. The authors acknowledged the problems of their small sample sizes and the short time frame. Perhaps more serious, however, were the crude controls for work experience they used, for this variable is extremely important in explaining the early career achievements of young men.[17]

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[16]This measure is an index from 0 to 96 of the socioeconomic prestige of occupations. See Chapter III for a detailed description.

[17]See, for example, Griliches (1976).

CHAPTER III

RESEARCH DESIGN

The Data Base

The data used in this study are from the National Longitudinal Surveys (NLS) of the labor market experience of young men and young women. More specifically, the data for the young men (aged 19-29 in 1971) are based on personal interviews conducted in October-December of 1971. Information regarding the young women (aged 19-29 in 1973) is based on the January-March wave of personal interviews in 1973.[1] The rich body of information on the personal and environmental characteristics of the respondents included in the NLS makes this data source ideal for an analysis of the labor market effects of schooling.

The universe for this study consists of all respondents who had left school between 1958 and 1970 (1960 and 1972 for the young women),

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[1]The young men and young women comprise two of the four age-sex cohorts included in the National Longitudinal Surveys. This ongoing project is sponsored by the Employment and Training Administration, U.S. Department of Labor. Each of the four cohorts was represented at the inception of the NLS by a national probability sample of approximately 5,000 individuals. The samples were drawn by the Bureau of the Census (which is also responsible for the field work) from the primary sampling units (PSU's) that had been selected for the experimental Monthly Labor Survey conducted between early 1964 and late 1966. In order to provide statistically reliable estimates for blacks, a sampling ratio for blacks three to four times as large as that for whites was used. For more detailed information regarding the NLS, see Center for Human Resource Research (1976).

completed only 9-12 years of schooling, and were not enrolled in school at the time of the 1971(3) survey.[2] In addition, those respondents not reporting information on one or more of the variables discussed below were excluded. The results are based on a cross-section of the reported responses to the dependent variables at the time of the survey.[3]

The Model

A three-equation recursive model is employed to determine the total contribution of schooling to the success measures (i.e., hourly rate of pay, occupational prestige, incidence and duration of unemployment in the past year) by treating post-school training and length of job tenure as endogenous variables. The following structural system is used:

1. Training = f[schooling measures (SCH); experience measures (EXP); personal characteristics (P); geographic influences (G)]

2. Tenure = g[schooling measures (SCH); experience measures (EXP); personal characteristics (P); geographic influences (G); training (TR)]

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[2]Exclusion of individuals who have attended college has the effect of understating the returns to high school, because one advantage of a high school diploma is the "option value" to attend college.

[3]To be included in the analysis the individual must have had some employment in the two-year period prior to the interview. Respondents not meeting the two-year requirement were excluded not by choice, but because of data limitations. To the extent that a sample of recently employed women is not a random sample of all women, a "selectivity bias" exists. The effect of this bias on the estimated returns to schooling is discussed in Chapter IV, pp. 68-70. The two-year requirement has virtually no effect on the sample of young men--more than 99 percent of male youth who were out of school by 1969 were employed at some time between 1969 and 1971.

3. Success = h[schooling measures (SCH); experience measures (EXP); personal characteristics (P); geographic influences (G); training (TR); tenure (TEN)]

The multi-equation specification of the model allows one to consider the functional interrelationships among the explanatory factors. While this approach is not unique, only a relatively small number of economic studies in this area involves estimating more than one equation, although the trend is in this direction.[4]

It is necessary to specify a structural system because educational attainment is likely to have indirect effects on labor market success through its influence on other human capital variables--namely, training and tenure. As discussed previously, graduation from high school may be expected to increase the probability that an individual will receive post-school institutional training not only because of the increased returns from training accruing to the graduate, but because the diploma may itself open avenues of training that are closed to dropouts.[5] In addition, individuals holding high school diplomas are expected to accumulate greater job tenure than high school dropouts for two reasons. First, graduates are more likely than dropouts to be accepted into jobs that promise relatively

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[4]Two examples of multi-equation approaches are Kohen (1973) and Griliches (1976).

[5]Kohen and Andrisani (1973) found a positive relationship between years of school completed and receipt of post-school training for the young men. Shea et al. (1971) found a similar relationship for the young women.

long-term on-the-job training with later payoffs. Second, dropouts are more likely than graduates to suffer involuntary job separations.[6]

In view of the well-known positive effect of training and tenure on labor market success, holding those measures constant in a single regression equation may obscure the "true" value of the education coefficient, because of schooling's possible indirect effects on success through training and tenure. The system described above allows determination of the indirect effects of education as well as its direct effects on the success variables, the sum of which is the total effect.

Mathematically, the model takes the following form:

$$TR = \alpha_0 + \alpha_1 SCH + \alpha_2 P + \alpha_3 G + \alpha_4 EXP + e_1$$

$$TEN = \beta_0 + \beta_1 SCH + \beta_2 P + \beta_3 G + \beta_4 EXP + \beta_5 TR + e_2$$

$$SUCCESS = \gamma_0 + \gamma_1 SCH + \gamma_2 P + \gamma_3 G + \gamma_4 EXP + \gamma_5 TR + \gamma_6 TEN + e_3$$

where: TR = Receipt of post-school training--dummy variable.

TEN = Months of service with current or last employer.

SUCCESS = Vector of the four labor market success variables (wage, occupational prestige, incidence and duration of unemployment).

SCH = A vector of two schooling variables. The first is a discrete variable indicating highest grade completed, which takes the values of 9-12. All respondents in the sample receive a value on this variable. The second component of SCH is a dummy variable which takes a value of 1 if the respondent is a high school graduate, and zero otherwise. Thus, the value taken by SCH for graduates is:

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[6] See Grasso (1977) for documentation of this relationship for the young men.

(coefficient of highest grade completed variable x 12) + (coefficient of dummy variable denoting graduate). The value taken by SCH for dropouts is: (coefficient of highest grade completed variable x the number of years of school completed).

P = Vector of personal characteristics [(ability, socioeconomic status of parental family, presence of health limitations, high school curriculum, marital status, presence of pre-school age children (young women only), and months served in the armed forces (young men only)].

G = Vector of geographic characteristics [residence in the South (wage equations only), and residence in an SMSA].

EXP = A vector of two labor market experience variables. The first is a "common" experience variable for both graduates and dropouts. For the young men this measure is defined as the number of years out of school; for the young women it is defined as the number of years since leaving school that the respondent worked six or more months. The range for these experience measures is one to thirteen years.[7] In addition to the "common" experience variable, an interacted graduate-experience variable (GRDEXP) was also included. GRDEXP was constructed by multiplying the dummy variable denoting graduate and the "common" experience term. Thus, the value taken by EXP for graduates is: (number of years of experience x the

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[7]"Experience" is defined in different ways for young men and young women because of data limitations (it was impossible to get the more preferable direct measures of experience for individuals who had left school before the initial surveys). Because historically young men have a stronger attachment to the labor market than young women, defining experience as the number of years since leaving school appears plausible for the male youth. However, for the young women such an approach is unsatisfactory. Fortunately, the 1973 questionnaire for the young women included the following question: "In how many of the _____years(s) since you left school would you say that you worked at least six months?" The recorded responses to this question were used as the experience measure for the female youth.

coefficient of common experience) + (number of years of experience x the coefficient of GRDEXP). The value taken by EXP for dropouts is: (the number of years of experience x the coefficient of "common" experience).

e_i = error terms (i = 1, 2, 3)

The model presented above is assumed to be recursive (i.e., no substantial "feedbacks" among the endogenous variables[8]). Because the assumptions of recursiveness cannot be rigorously tested, any defense of a recursive system (or its complement--a fully interdependent model) depends upon one's view of the economic world. Wold (1954) has argued that economic systems are recursive, because institutional realities are such that few markets are truly determined simultaneously.[9]

One desirable property of this recursive structure is that it allows calculation of the direct and indirect effects of education because recursive systems are always identified.[10] In addition, each equation may be estimated by application of ordinary least squares regression analysis.[11]

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[8]This condition implies that the disturbances in the three equations are uncorrelated with each other (i.e., there exists a diagonal error-covariance matrix for the system of equations). Because the disturbances are defined as measurement error, it is difficult to conceive of them being correlated either across individuals or across equations.

[9]See L'Esperance (1972) for a review of this debate.

[10]See Theil (1971) or Johnston (1972).

[11]In the case of the training and incidence of unemployment equation, the dependent variable is distributed binomially. Because

Direct and Indirect Effects

As mentioned, because the model is recursive, we can define and calculate indirect effects of schooling as well as the direct effects.[12] The direct and indirect effects of schooling on the success measures are defined as follows:

Endogenous variables	Direct effect	First order indirect effects	Second order indirect effects
TR[a]	$(\partial pTR/\partial SCH^*)=\alpha_1$	———	———
TEN	$(\partial TEN/\partial SCH^*)=\beta_1$	$(\partial TEN/\partial pTR)(\partial pTR/\partial SCH^*) = \beta_5\alpha_1$	———
∂SUCCESS[b]	$(\partial SUCCESS/\partial SCH^*) = \gamma_1$	$(\partial SUCCESS/\partial pTR)(\partial pTR/\partial SCH^*) = \gamma_5\alpha_1$ $(\partial SUCCESS/\partial TEN)(\partial TEN/\partial SCH^*) = \gamma_6\beta_1$	$(\partial SUCCESS/\partial TEN)(\partial TEN/\partial pTR)(\partial pTR/\partial SCH^*)= \gamma_6\beta_5\alpha_1$

NOTE: "SCH*" is defined as SCH (defined on p. 35) plus the interacted graduate-experience term, GRDEXP (defined on p. 36).

a Because the training equation is estimated by logit analysis, the partial derivative must be interpreted as a probability measure. See Ben-Porath (1976), p. S712.[13]

b One of the success measures--the incidence of unemployment--is also estimated by logit analysis. As explained in note "a" above, the partial derivatives must be interpreted as probability measures. Thus, for the incidence of unemployment equation, "∂pSUCCESS" should be substituted for "∂SUCCESS."

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ordinary least squares analysis requires that the dependent variable be distributed as a normal, logit analysis is used to estimate these equations. See Theil (1971).

[12]This technique is similar to path analysis, which was developed by geneticist Sewell Wright. For a discussion of recursive systems and path analysis, see Blalock (1971).

[13]Because the coefficients in the logit equations are not partial derivatives, they must first be "converted" to partial derivatives of a probability measure. For example, the derivative of the probability of training with respect to SCH* is $(\partial pTR/\partial SCH^*) = b_1\bar{p}\ (1-\bar{p})$, where b_1 is the logit coefficient and $\bar{p}$ is the mean probability of training.

Thus, the total effect is:

$$(\partial SUCCESS/\partial SCH^*) + (\partial SUCCESS/\partial pTR)(\partial pTR/\partial SCH^*) + (\partial SUCCESS/\partial TEN)(\partial TEN/\partial SCH^*) + (\partial SUCCESS/\partial TEN)(\partial TEN/\partial pTR)(\partial pTR/\partial SCH^*) = \gamma_1 + \gamma_5\alpha_1 + \gamma_6(\beta_1 + \beta_5\alpha_1),$$

evaluated at various levels of experience.

The Variables

Dependent Variables

Four dimensions of labor market success are investigated by means of the above model. As a measure of financial success, hourly rate of pay at current or last job (in 1971 dollars) is the dependent variable.[14] The use of this variable will avoid the problems associated with measures of annual income or earnings discussed in Chapter II.

Occupational prestige at current or last job is measured by the Duncan index of socioeconomic status in the case of young men, and the Bose index in the case of young women.[15] Because these measures are

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[14] Individuals with recorded hourly wages of less than $.50 or more than $20.00 were excluded from the sample, because of the high probability that the extremely high or low wage was the result of a clerical error.

[15] The Duncan index is an ordinal measure of the prestige of an occupation, developed from the responses of a sample of the U.S. population in 1947 to questions about the prestige of 45 selected occupations. Data in the 1950 census were converted to two summary measures, reflecting for each of the 45 occupations (1) the proportion of male workers in 1950 with educational attainment of four years of high school or more and (2) the proportion of males with incomes of $3,500 or more in 1949. The multiple regression of percent "excellent" or "good" prestige ratings on the education and income measures was calculated. Using the regression weights obtained in this calculation, all census occupations were assigned scores on the basis of their

ordinal rather than cardinal, care must be taken in interpreting the regression coefficients.[16]

Two measures of employment stability are investigated--incidence and duration of unemployment in the last twelve months. The former is analyzed by inclusion of a dichotomous variable representing either no weeks of unemployment in the past year (=0) or some weeks of unemployment (=1). Duration of unemployment is analyzed by means of an unemployment equation with a continuous dependent variable expressed in number of weeks.

As has been mentioned, training and tenure are also used as endogenous variables in the analysis. Training is a dichotomous variable which takes a value of 1 if the respondent has completed a post-school occupational training program (or if the individual dropped out of a training program but responded affirmatively when

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education and income distributions. Finally, a two-digit status score ranging from 0 to 96 was assigned to each three-digit occupational category in the census classification scheme. See Duncan (1961). The Bose index is also an ordinal measure of the prestige of an occupation, developed from the responses of a sample of 197 white households in the Baltimore metropolitan area to questions about the prestige of 110 selected occupations. These rankings within each occupation were averaged and the mean values transformed to a metric with values 0 to 100. The latter scores were regressed on the 1959 median earnings and 1960 median years of school completed of the civilian experienced female labor force employed in these occupations. The resultant equation was then used to estimate the mean prestige scores for all census three-digit occupations in which women in the NLS sample were represented. See Bose (1973).

[16] For example, a doubling of the occupational status score does not necessarily represent a doubling of status.

asked if he or she used the training on the current job[17]) and zero otherwise. Length of job tenure on the current or last job is measured in months. Both training and tenure are expected to bear a positive relationship to years of school completed and to the success measures.[18]

Independent Variables

Although this study does not focus on the question of "who" drops out of high school (that is, the probability of dropping out is not estimated), information on these characteristics must be ascertained in order to control for them when observing the consequences of early school termination. Hill (1975) has estimated the probability of dropping out of high school using the NLS data. He concluded that dropouts were more likely than graduates to come from families of low socioeconomic status, to have lower ability, and were less likely to have been enrolled in a vocational-commercial high school curriculum. Thus, those variables are included in this study. The entire set of independent variables is elaborated below.

The major explanatory variables consist of a dummy which takes a value of 1 if the respondent is a high school graduate (GRAD), and an education variable taking values from 9 through 12 (SCHOOLING). The economic rationale for the inclusion of GRAD is that completion

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[17] Individuals falling into this category were included as having had training under the assumption that they were likely to have been "job-outs" from training programs.

[18] See pp. 34-5.

of the final year of high school means more than simply one additional year of schooling--a credential is also obtained. Thus, the presence of the GRAD variable allows for the possible discontinuity in the returns to schooling. Both schooling measures are hypothesized to be related positively to wages, occupational prestige, training, and tenure; and negatively related to the unemployment criteria.

Because the effect of graduation may differ at different points in the life-cycle, an interacted graduate-experience variable (GRDEXP) is included as well as a "common" experience term for dropouts and graduates (EXPERIENCE). The rationale for inclusion of GRDEXP is that high school graduates may exhibit different "success-experience" profiles over time from those of the dropouts. Specifically, it is hypothesized that graduates will have steeper profiles over time.[19] By the way in which the sample was selected, both experience terms have a maximum value of 13 (years).[20] Wage, occupational status, training, and tenure are expected to vary positively with the experience terms, while the reverse is expected with regard to the unemployment variables.

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[19]See the discussion of Becker (1975) and Mincer (1974) in Chapter II, p. 27.

[20]The sample of young men includes those who left school between 1958 and 1970. Since the cross-section of the success measures was taken in 1971, the maximum number of years of experience any individual could have obtained was thirteen. Analogously, the sample of young women included individuals who left school between 1960 and 1972, while the cross-section was performed in 1973. For the definition of EXPERIENCE as used in this study, see footnote 7, p. 36.

A number of personal characteristics also enter the regression equations. Knowledge of the world of work (KWW), a variable based on an occupational information test administered to the young men in 1966 and to the young women in 1969, proxies for "ability."[21] The measure of IQ available in the NLS data is not used because of the very large nonresponse rate, especially for rural blacks. Also, IQ results are not available for individuals entering high school after the initial round of interviews.[22] However, KWW may be a more relevant measure of "ability" in a labor market context than IQ. Griliches (1976) reports that KWW ". . .should reflect both the quantity and quality of schooling, intelligence, and motivation. . .it seems to perform rather similarly (and parallel) to the IQ variable (p. S75)." Because KWW is not independent of schooling--KWW was related to positively to years of school completed when the test was administered--introduction of KWW as a control in the regression equations may introduce a downward bias into the estimated schooling coefficients [see Griliches (1976)]. Following a method similar to

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[21]For the young men, this test examined three components of occupational knowledge: occupational duties, educational requirements for entrance, and earnings differentials among occupations. KWW was limited to a knowledge of occupational duties in the case of young women. For information on the scoring and structure of the male test see Parnes and Kohen (1975). For comparable information relating to females, see Mott and Moore (1976). Reproductions of these tests appear in Appendix B.

[22]Black males have an IQ nonresponse rate of 56 percent; the comparable figure for white males is 26 percent. The nonresponse rate to KWW is less than 2 percent for both groups.

that used by Lazear (1977), it is possible to instrumentalize KWW ($\hat{KWW}$) to "purge" this measure of its schooling component, leaving the "ability" element.[23]

Because the value of schooling may be dependent on high school curriculum choices [see Hill (1975) and Grasso (1975)], dummy variables for type of high school curriculum (general, college preparatory, and vocational-commercial) are included. An index of the socioeconomic status of the parental family (SES) is also included,[24] since work by Griffin (1976) has shown that the absence of SES from earnings equations will result in upwardly biased estimates of the returns to schooling if SES and schooling are positively correlated.[25] SES is expected to bear a positive relationship to wage for two reasons. First, SES may serve as a proxy for parental role models; and second,

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[23]Since we know that KWW is a function of "ability" and schooling, we can "standardize" KWW to reflect only ability in the following way: Set KWW = (constant term, years of school completed, X) where years of school completed consists of four dummy variables (9-12) and X includes all of the exogenous variables in the model. To calculate $\hat{KWW}$, the coefficient associated with a given year of schooling is subtracted from the raw KWW score, leaving the "ability" component. This technique was used to calculate a separate $\hat{KWW}$ for each of the four race-sex groups. Scores on this variable may range from 0 to 56.

[24]SES is derived from a continuous index of parental socioeconomic status based on five components: father's education, mother's education, education of oldest older sibling (if any), father's occupation, and availability of reading material in the home when the respondent was fourteen. For a description of the measure, see Kohen (1973). Scores on this variable may range from 0 to 16.

[25]The assertion that omitting SES from a wage equation will bias the schooling coefficient holds only if the "true" wage equation is a function of SES and schooling.

this variable may reflect the provision of job contacts (or outright nepotism) by the family.

Presence of health limitations is controlled by inclusion of a dichotomous variable that takes a value of 1 if the respondent has a health problem affecting work, and 0 otherwise. The degree of financial responsibilities is represented by a dichotomous marital status variable (1 if married, spouse present--0 otherwise). In the case of the young men this variable is expected to be related positively to wages and occupational prestige, and negatively to the unemployment measures. For the young women, the expected effect of marital status in unclear. On the one hand, a married woman with an employed husband has a lesser degree of family financial responsibility than does a single woman living alone. On the other hand, there may be "selectivity effects" operating in the opposite direction. That is, a married woman faces three choices rather than the traditional work-leisure dichotomy. The third alternative, according to recent labor market theory, is that the woman can be involved in "household production." If the demand for a woman's "home time" increases, her price of time will also increase. This reduces her tendency to work in the market, by increasing her "reservation wage" (i.e., the minimum wage offer that she deems acceptable). To the extent that married women place a higher value on home time than single women, the observed wages of the former group will be higher than the latter, ceteris paribus.[26]

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[26] See Gronau (1974). For a discussion of the effect of this bias on the estimated returns to schooling, see Chapter IV p. 68.

Presence of pre-school age children is also included in the case of young women, and it is expected to bear a negative relationship to labor market success for this group by serving as an indicator of probable restrictions on availability (e.g., part-time work). The aforementioned selectivity bias may also operate in this case,[27] but the expectation is that it will be overwhelmed by the effect of availability restrictions. For the young men, a continuous variable denoting months of military service appears in all equations.[28] The

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[27]See Michael and Lazear (1971).

[28]Because the cross-section of the success measures was taken in the Vietnam war era (1971), there is a possibility that the sample of the non-military youth population (from which the NLS surveys were drawn) was not entirely random that year. More recent, abbreviated surveys of male youth have been conducted by the NLS since 1971 (the 1973 and 1975 results are currently available), which include individuals who have returned to the civilian sector. In 1975, 104 whites (95 high school graduates and 9 dropouts) and 50 blacks (40 graduates and 10 dropouts) returned to the sample who were not available for personal interviews in 1971. To see if there was a "difference" between those serving in the military in 1971 and individuals who were not then serving, it was possible to compare the 1971 characteristics of those who were not serving in 1971 with the characteristics (as measured in 1975) of those persons who returned to the sample. The following five characteristics were considered: SES, ability, marital status, health condition, and region and type of residence. A t-test was performed on the difference of means between the two independent samples. The only statistically significant (at the .10 level for a two-tailed test) differences were: white graduates and white dropouts who were serving in the military in 1971 had lower measured ability in 1975; white dropouts serving in 1971 were less likely to live in the South; black graduate veterans were more likely to be living in an SMSA; and black dropouts who were serving in the military in 1971 were more likely to have a health condition affecting work in 1975. There were no statistically significant differences between the two groups along the dimensions of SES and marital status. Thus, there does not appear to be a substantial selectivity bias operating in this case.

hypothesized effect of this variable is unclear. On the one hand, employers may be expected to "hire the vet." Alternatively, military service may prove counterproductive in the civilian sector if it merely represents a discontinuity in civilian experience.[29]

Two variables reflecting geographic influences enter the equations. SMSA (a dichotomous variable with a value of 1 if the respondent lives in an SMSA) serves as a proxy for price level variations and demand conditions. A dichotomous variable taking a value of 1 for Southern residence is an additional price level control in the wage equations.

Finally, the analysis is performed separately for young men and young women of both races. The existence of racial differences in the returns to schooling has been well documented, at least for males.[30] Sex differences in the returns to education are also likely, although little research has been done on this topic.[31] Although this study does not focus on racial or sex differences, some implications are drawn and related to public policy. Table 6 presents in tabular form the variables included in the analyses, as well as the direction of their hypothesized effects.

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[29]For an exploration of this topic, see Kohen and Shields (1977).

[30]See, for example, Welch (1973).

[31]Two rate-of-return studies that include results for females are Hines, Tweeten, and Redfern (1970) and Carnoy and Marenbach (1975). In addition, Kohen and Roderick (1975) used the NLS data to explore this question.

Table 6: Variables and Hypothesized Associations

Explanatory variables[a]	Dependent variables					
	WAGE (1971 dollars)	DUNCAN/ BOSE INDEX	INCIDENCE OF UNEMPLOYMENT	DURATION OF UNEMPLOYMENT	TRAINING	TENURE
TRAINING (TR)	+	+	-	-		
TENURE (TEN)	+	+	-	-		
GRAD	+	+	-	-	+	+
SCHOOLING	+	+	-	-	+	+
GRDEXP	+	+	-	-	+	+
EXPERIENCE	+	+	-	-	+	+
ABILITY	+	+	-	-	+	+
GENERAL CURR. (ref.)						
COLLEGE PREP. CURR.	?	?	?	?	?	?
VOC., COMM. CURR.	+	+	-	-	+	+
SES	+	+	-	-	+	+
HEALTH LIMITATIONS	-	-	+	+	-	-
MARRIED (young men)	+	+	-	-	+	+
MARRIED (young women)	?	?	?	?	?	?
CHILDRN ≤ 6[b]	-	-	?	?	-	-
SOUTH	-					
SMSA	+	+	-	-	+	+
MILITARY SERVICE[c]	?	?	?	?	?	-

a See text for a description of these variables.
b Young women only.
c Young men only.

CHAPTER IV

EMPIRICAL RESULTS

Gross Comparisons Between High School Graduates and Dropouts

Prior to reporting the results of the regression analysis, it is useful to present the means of the independent and dependent variables that are used in the study (Table 7). A perusal of the figures in Table 7 answers many of the questions typically asked (and typically published) about high school dropouts. However, it must be borne in mind when interpreting the success measures that these results are uncontrolled for the independent variables listed in the table.

High school graduates earn higher wages, have higher occupational prestige scores, and are less likely to be unemployed than the dropout group, despite the fact that male graduates have less experience on average and are more likely to have served in the military. In addition, graduates are more likely to have received post-school training and to have built up greater tenure (except for black males).

High school dropouts are more likely to have been enrolled in a "general" curriculum, to have health limitations affecting work (except black males), to live in the South, and, (in the case of females) to have young children. Graduates have higher socioeconomic status scores, are more likely to live in an SMSA, and have a higher probability of having been enrolled in a college preparatory or vocational-commercial curriculum.

Table 7: Means of Variables in the Analysis

(Standard deviations)

Variables[a]	Young men				Young women			
	WHITES		BLACKS		WHITES		BLACKS	
	Graduates	Dropouts	Graduates	Dropouts	Graduates	Dropouts	Graduates	Dropouts
WAGE (1971 dollars)	3.55	3.22	2.87	2.50	2.46	2.17	2.40	2.10
	(1.49)	(1.30)	(1.09)	(0.93)	(.96)	(1.17)	(.81)	(1.18)
DUNCAN/BOSE INDEX	32.09	24.14	21.91	17.31	46.65	39.07	41.25	34.52
	(19.71)	(15.65)	(14.65)	(11.97)	(9.46)	(10.64)	(10.78)	(11.94)
INCIDENCE OF UNEMPLOYMENT	.24	.32	.35	.39	.20	.26	.29	.31
	(.43)	(.47)	(.48)	(.49)	(.40)	(.44)	(.46)	(.46)
DURATION OF UNEMPLOYMENT (months)	3.01	3.26	4.67	6.12	1.70	2.21	2.76	3.01
	(8.08)	(7.34)	(9.98)	(11.65)	(5.16)	(6.88)	(7.19)	(7.69)
TRAINING	.51	.33	.34	.24	.51	.31	.44	.35
	(.50)	(.47)	(.48)	(.42)	(.50)	(.46)	(.50)	(.48)
TENURE (months)	31.36	24.85	20.66	22.94	25.00	18.23	23.98	17.24
	(32.66)	(28.70)	(22.45)	(26.55)	(25.88)	(23.03)	(23.42)	(16.94)
EXPERIENCE (years)	5.92	7.02	5.26	6.40	4.51	4.39	4.28	3.91
	(3.48)	(3.38)	(3.29)	(3.34)	(2.60)	(3.00)	(2.48)	(2.87)
ABILITY[b]	29.26	28.72	23.91	24.40	35.40	37.09	26.26	27.02
	(6.91)	(7.43)	(7.00)	(7.63)	(9.17)	(10.14)	(11.78)	(12.61)
GENERAL CURRICULUM	.56	.68	.62	.68	.43	.65	.60	.76
	(.50)	(.47)	(.48)	(.47)	(.50)	(.48)	(.49)	(.43)
COLLEGE PREP. CURR.	.18	.07	.12	.02	.21	.11	.13	.07
	(.39)	(.25)	(.32)	(.15)	(.41)	(.32)	(.34)	(.26)
VOC., COMM. CURR.	.22	.16	.22	.17	.34	.21	.25	.12
	(.41)	(.37)	(.41)	(.38)	(.47)	(.41)	(.43)	(.33)
SES	10.10	9.16	8.38	7.92	10.29	9.28	8.57	7.65
	(1.65)	(1.94)	(1.67)	(1.74)	(1.70)	(1.87)	(1.90)	(1.86)
HEALTH LIMITATIONS	.09	.10	.08	.04	.06	.12	.07	.10
	(.28)	(.29)	(.27)	(.20)	(.23)	(.33)	(.25)	(.31)
MARRIED	.64	.63	.48	.45	.67	.73	.46	.44
	(.48)	(.48)	(.50)	(.50)	(.47)	(.44)	(.50)	(.50)
CHILDREN $\leq$ 6					.40	.59	.55	.65
					(.49)	(.49)	(.50)	(.48)
SOUTH	.28	.40	.62	.64	.30	.51	.53	.70
	(.45)	(.49)	(.49)	(.48)	(.46)	(.50)	(.50)	(.46)
SMSA	.60	.56	.73	.69	.65	.57	.73	.62
	(.49)	(.50)	(.45)	(.46)	(.48)	(.50)	(.44)	(.49)
MILITARY SERVICE (months)	8.40	6.53	6.90	3.32				
	(14.73)	(13.33)	(12.56)	(9.06)				

a See text for a description of these variables.
b This measure has been purged of its schooling related component. See footnote 23.

Finally, there is no systematic difference between graduates and dropouts regarding the likelihood of being married. Surprisingly, neither is there any difference between the two groups in measured ability. (However, this result is not much different from the findings of Bachman et al. (1971) regarding the difference in ability between graduates and dropouts.) Had the proxy for ability ($\hat{KWW}$) not been purged of the influence of ultimate years of school completed, all four groups of graduates would have had higher measured ability than the respective dropout cohorts.[1] In other words, if we were to compare the measured ability of individuals who were currently enrolled in the same year in school, those who subsequently graduated would have scored higher than those who later dropped out.

Some General Findings--Control Variables

This section highlights some findings that, while not central to the primary focus of the study, are interesting in their own right. From this point on, the analysis is controlled for the effects of the exogenous variables in the model. That is, the independent effects of all the variables discussed here are "held constant" in order to determine the "pure" contribution of each to labor market success. The following results are found in Tables 8-11.

Personal Characteristics

Ability is a statistically significant determinant of occupational status for all race-sex cohorts and has a significant wage effect for

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[1] See footnote 23, Chapter III, for a description of $\hat{KWW}$.

Table 8: 1971 Cross-Section Regression Results for White Young Men

(t-values)

Explanatory variables[a]	Dependent variables					
	WAGE (1971 dollars)	DUNCAN INDEX	INCIDENCE OF UNEMPLOYMENT[b]	DURATION OF UNEMPLOYMENT	TRAINING[b]	TENURE (months)
TRAINING	.284	7.256	-.201	-.339		2.254
	(3.48)***	(6.36)***	(-1.10)	(-0.68)		(1.26)
TENURE (months)	.005	.097	-.054	-.062		
	(3.40)***	(4.81)***	(-9.18)***	(-7.03)***		
GRAD	-.377	-.214	-.077	2.132	-.004	-11.161
	(-1.38)	(-0.06)	(-0.15)	(1.29)	(-0.01)	(-1.87)
SCHOOLING	.251	1.255	-.287	-1.409	.184	6.066
	(2.45)***	(0.88)	(-1.43)*	(-2.26)**	(1.01)	(2.71)***
GRDEXP	.021	.318	.038	.042	.055	1.664
	(0.77)	(0.83)	(0.66)	(0.25)	(1.15)	(2.79)***
EXPERIENCE	.070	-.404	-.066	-.031	.029	2.502
	(2.82)***	(-1.16)	(-1.35)*	(-0.21)	(0.67)	(4.64)***
ABILITY	.015	.404	.011	.043	.026	.341
	(2.35)***	(4.59)***	(0.88)	(1.14)	(2.43)***	(2.48)***
GENERAL CURR. (ref.)						
COLLEGE PREP. CURR.	.019	4.355	-.006	.783	.053	5.305
	(0.16)	(2.67)***	(-0.02)	(1.11)	(0.27)	(2.08)**
VOC., COMM. CURR.	-.062	-.615	.251	.885	.211	.405
	(-0.62)	(-0.44)	(1.23)	(1.46)	(1.26)	(0.19)
SES	.035	.949	.096	.286	.104	-1.142
	(1.38)*	(2.75)***	(1.89)	(1.91)	(2.49)***	(-2.12)
HEALTH LIMITATIONS	-.193	-3.038	.257	1.715	-.173	-7.116
	(-1.39)*	(-1.57)*	(0.98)	(2.04)**	(-0.74)	(-2.35)***
MARRIED	.505	3.412	-.136	-1.463	.303	7.867
	(5.68)***	(2.75)***	(-0.79)	(-2.71)***	(2.04)**	(4.07)***
SOUTH	-.535					
	(-6.01)***					
SMSA	.496	.576	-.140	.162	.255	1.862
	(6.00)***	(0.51)	(-0.84)	(0.33)	(1.87)**	(1.05)
MILITARY SERVICE (months)	-.002	-.002	-.002	-.027	.009	-.413
	(-0.82)	(-0.06)	(-0.26)	(-1.56)*	(1.82)*	(-6.75)***
CONSTANT	-1.128	-13.276	2.454	16.249	-4.918	-57.643
	(-1.06)	(-0.90)	(1.19)	(2.54)	(-2.62)	(-2.51)
$\bar{R}^2$	.268	.176	.194[c]	.090	.086[c]	.271
Likelihood ratio test[d]	25.87***	16.52***	220***	8.17***	92***	30.12***
N	1018	1018	1018	1018	1018	1018
Mean of dep. vbl.	3.47	30.20	.26	3.07	.47	29.80
Std. dev. of dep. vbl.	1.45	19.12		7.91		31.87
S.E.E.	1.24	17.35		7.54		27.21

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

Table 9: 1971 Cross-Section Regression Results for Black Young Men

(t-values)

Explanatory variables[a]	Dependent variables					
	WAGE (1971 dollars)	DUNCAN INDEX	INCIDENCE OF UNEMPLOYMENT[b]	DURATION OF UNEMPLOYMENT	TRAINING[b]	TENURE (months)
TRAINING	.276	5.651	.479	.903		-1.046
	(3.04)***	(4.00)***	(1.69)	(0.84)		(-0.45)
TENURE (months)	.008	.048	-.103	-.133		
	(4.18)***	(1.63)*	(-7.65)***	(-5.87)***		
GRAD	.073	5.206	-.730	-4.305	-.086	-3.005
	(0.31)	(1.43)*	(-1.01)	(-1.55)*	(-0.13)	(-0.50)
SCHOOLING	-.002	.268	.298	.697	-.156	2.094
	(-0.02)	(0.20)	(1.08)	(0.68)	(-0.63)	(0.94)
GRDEXP	.035	-.494	-.038	.186	.131	.324
	(1.34)*	(-1.22)	(-0.44)	(0.60)	(1.80)**	(0.48)
EXPERIENCE	-.011	.001	.064	.059	-.112	2.676
	(-0.50)	(0.00)	(0.94)	(0.24)	(-1.82)	(5.07)***
ABILITY	.005	.148	.009	.093	.017	.312
	(0.68)	(1.44)*	(0.43)	(1.18)	(0.97)	(1.84)**
GENERAL CURR. (ref.)						
COLLEGE PREP. CURR.	-.113	5.407	.501	1.068	.437	.596
	(-0.71)	(2.18)**	(1.01)	(0.56)	(1.10)	(0.14)
VOC., COMM. CURR.	.079	-.463	.139	1.553	.012	-.970
	(0.75)	(-0.28)	(0.43)	(1.25)	(0.04)	(-0.36)
SES	.099	-.062	-.101	-.060	.111	-.491
	(3.54)***	(-0.14)	(-1.19)	(-0.18)	(1.48)*	(-0.69)
HEALTH LIMITATIONS	-.338	-4.355	.361	3.838	.379	-10.183
	(-1.98)**	(-1.65)**	(0.74)	(1.90)**	(0.88)	(-2.34)***
MARRIED	.242	3.248	-.884	-4.107	.466	3.505
	(2.71)***	(2.36)***	(-3.25)***	(-3.83)***	(1.99)**	(1.54)*
SOUTH	-.686					
	(-7.29)***					
SMSA	.293	2.764	.608	.335	-.072	-2.404
	(2.80)***	(1.77)**	(1.94)	(0.28)	(-0.26)	(-0.93)
MILITARY SERVICE (months)	.010	.141	.004	.003	.008	-.390
	(2.65)***	(2.37)**	(0.38)	(0.07)	(0.85)	(-4.01)***
CONSTANT	1.541	5.364	-1.901	.968	-.462	-16.553
	(1.68)	(0.38)	(-0.67)	(0.09)	(-0.18)	(-0.71)
$\bar{R}^2$	.350	.110	.333[c]	.136	.049[c]	.200
Likelihood ratio Test[d]	16.28***	4.75***	172***	5.79***	21**	9.20***
N	426	426	426	426	426	426
Mean of dep. vbl.	2.72	20.07	.37	5.25	.30	21.57
Std. dev. of dep. vbl.	1.04	13.81		10.69		24.16
S.E.E.	.84	13.03		9.93		21.61

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

Table 10: 1973 Cross-Section Results for White Young Women

(t-values)

Explanatory variables[a]	Dependent variables					
	WAGE (1971 dollars)	BOSE INDEX	INCIDENCE OF UNEMPLOYMENT[b]	DURATION OF UNEMPLOYMENT	TRAINING[b]	TENURE (months)
TRAINING	.191 (3.19)***	2.315 (3.82)***	.254 (1.41)	.255 (0.71)		-1.896 (-1.31)
TENURE (months)	.008 (6.02)***	.023 (1.70)**	-.076 (-8.34)***	-.039 (-4.91)***		
GRAD	-.170 (-0.77)	-.945 (-0.42)	.157 (0.26)	-.597 (-0.45)	.946 (1.68)**	-4.313 (-0.81)
SCHOOLING	.023 (0.24)	2.732 (2.81)***	-.078 (-0.29)	-.483 (-0.84)	.171 (0.68)	1.082 (0.47)
GRDEXP	.034 (1.26)	.333 (1.20)	-.021 (-0.24)	.281 (1.71)	-.077 (-1.14)	1.801 (2.74)***
EXPERIENCE	.048 (1.91)**	.104 (0.41)	-.017 (-0.23)	-.309 (-2.06)**	.171 (2.76)***	3.686 (6.23)***
ABILITY	.004 (1.15)	.072 (2.17)**	-.004 (-0.39)	.029 (1.50)	.029 (3.70)***	-.086 (-1.09)
GENERAL CURR. (ref.)						
COLLEGE PREP. CURR.	.118 (1.46)	1.512 (1.86)*	-.465 (-1.86)*	-.309 (-0.64)	.386 (2.04)**	2.918 (1.51)
VOC., COMM. CURR.	.139 (2.02)**	1.954 (2.84)***	-.074 (-0.35)	-.202 (-0.49)	-.095 (-0.59)	2.617 (1.59)*
SES	.037 (2.11)**	1.062 (5.97)***	-.013 (-0.24)	.045 (0.43)	.098 (2.32)**	-.573 (-1.35)
HEALTH LIMITATIONS	-.307 (-2.61)***	-.406 (-0.34)	.394 (1.16)	1.742 (2.48)***	.358 (1.29)	.420 (0.15)
MARRIED	.076 (1.15)	1.100 (1.65)*	-.246 (-1.27)	-.736 (-1.86)*	-.075 (-0.48)	-.330 (-0.21)
CHILDREN $\leq$ 6	-.193 (-3.06)***	-1.336 (-2.10)**	-.296 (-1.55)	-.377 (-1.00)	.317 (2.14)	-5.440 (-3.61)***
SOUTH	-.164 (-2.56)***					
SMSA	.242 (3.95)***	1.973 (3.22)***	-.148 (-0.81)	-.539 (-1.48)*	.337 (2.35)***	-1.943 (-1.33)
CONSTANT	1.028 (1.02)	-4.811 (-0.47)	1.306 (0.48)	8.602 (1.43)	-5.794 (-2.17)	3.631 (0.15)
$\bar{R}^2$	.212	.200	.168[c]	.049	.095[c]	.299
Likelihood ratio test[d]	18.45***	18.30***	179***	4.54***	97***	32.85***
N	972	972	972	972	972	972
Mean of dep. vbl.	2.42	45.48	.21	1.78	.48	23.96
Std. dev. of dep. vbl.	1.00	10.03		5.46		25.56
S.E.E.	.89	8.97		5.33		21.40

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.

* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

Table 11: 1973 Cross-Section Results for Black Young Women

(t-values)

Explanatory variables[a]	Dependent variables					
	WAGE (1971 dollars)	BOSE INDEX	INCIDENCE OF UNEMPLOYMENT[b]	DURATION OF UNEMPLOYMENT	TRAINING[b]	TENURE (months)
TRAINING	-.025	5.018	.295	.362		3.067
	(-0.28)	(4.51)***	(1.02)	(0.45)		(1.46)*
TENURE (months)	.009	.014	-.077	-.064		
	(4.10)***	(0.49)	(-6.22)***	(-3.15)***		
GRAD	-.103	3.974	.127	-1.835	-.727	-2.786
	(-0.46)	(1.41)*	(0.18)	(-0.90)	(-1.17)	(-0.52)
SCHOOLING	.001	.791	-.109	.818	.918	-1.451
	(0.01)	(0.67)	(-0.38)	(0.97)	(3.00)***	(-0.65)
GRDEXP	.027	-.344	.096	.263	-.143	2.420
	(0.80)	(-0.82)	(0.80)	(0.87)	(-1.52)	(3.08)***
EXPERIENCE	-.019	.253	-.204	-.579	.152	2.280
	(-0.68)	(0.74)	(-2.09)**	(-2.34)***	(1.93)**	(3.56)***
ABILITY	.011	.086	.013	.026	.032	.048
	(2.90)***	(1.74)**	(1.00)	(0.74)	(2.97)***	(0.52)
GENERAL CURR. (ref.)						
COLLEGE PREP. CURR.	.097	.979	-.899	-1.438	.340	3.141
	(0.68)	(0.55)	(-1.88)*	(-1.12)	(0.90)	(0.93)
VOC., COMM. CURR.	.098	3.615	-.455	-1.252	.266	4.105
	(0.92)	(2.70)***	(-1.24)	(-1.30)*	(0.94)	(1.62)*
SES	.081	.892	-.061	-.294	.097	-.469
	(3.28)***	(2.88)***	(-0.78)	(-1.32)*	(1.43)*	(-0.80)
HEALTH LIMITATIONS	-.183	-2.238	.112	-.931	-.355	-7.884
	(-1.17)	(-1.14)	(0.24)	(-0.66)	(-0.81)	(-2.14)**
MARRIED	.134	.635	.316	-.435	.016	-.574
	(1.53)	(0.58)	(1.12)	(-0.55)	(0.07)	(-0.28)
CHILDREN $\leq$ 6	-.150	-3.006	-.423	-.375	-.048	.191
	(-1.70)**	(-2.70)***	(-1.47)	(-0.47)	(-0.20)	(0.09)
SOUTH	-.647					
	(-7.02)***					
SMSA	.163	4.859	.432	.756	.038	1.557
	(1.70)**	(4.14)***	(1.46)	(0.90)	(0.15)	(0.70)
CONSTANT	1.480	12.684	1.989	-.256	-12.359	23.607
	(1.50)	(1.04)	(0.66)	(-0.03)	(-3.76)	(1.02)
$\bar{R}^2$	.312	.263	.238[c]	.057	.107[c]	.260
Likelihood ratio test[d]	12.14***	10.40***	100***	2.58***	42***	10.93***
N	369	369	369	369	369	369
Mean of dep. vbl.	2.31	39.17	.30	2.83	.41	21.89
Std. dev. of dep. vbl.	.95	11.56		7.34		21.83
S.E.E.	.79	9.92		7.13		18.78

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

white young men and black young women. Post-school training is a positive function of ability for all but the black men, while the amount of tenure is significantly related to ability in the case of both racial groups of young men but not of the women.

Parental socioeconomic status is related positively to wages for all groups, but there is no significant effect of this variable on tenure, and almost none on unemployment. Except for black young men, SES plays a large role in determining occupational status, in addition to being related to the incidence of post-school training for all four cohorts.

Presence of health limitations is negatively related to wages for all but the black young women, but this variable is a detriment to achievement of occupational status only for the young men. Somewhat surprisingly, individuals with health problems are not significantly less likely to receive additional training--however, they are less likely to have built up as much tenure as healthy persons. In addition, health limitations are a significant determinant of the duration of unemployment.

There is a significant relationship for the young men between being married and labor market success. The married male respondents had higher earnings and occupational prestige, lower incidence and duration of unemployment, a higher probability of receiving training, and more job tenure as compared to their unmarried counterparts. However, the direction of causality is unclear. On the one hand, it is possible that the characteristics associated with a young man

being married are also characteristics that make these men attractive to employers (e.g., stability, maturity, etc.). Alternatively, success in the labor market may make young men more competitive in the "marriage market." Also, the financial responsibilities of marriage may help explain the results. The patterns obtaining among the men are not discernible among the women. While married white women had higher job prestige and fewer weeks of unemployment than their nonmarried counterparts, married black women had no significant labor market advantages.[2]

The presence of young children in the household had significant negative effects on both the wages and occupational prestige of young women. White young women with children were also significantly less likely to have as much job tenure as white women without children. A more surprising finding is that black women without young children did not, on average, have more tenure than black women with children (see footnote 2).

As expected, military service had a negative effect on civilian job tenure. What is less easily explained was that armed forces experience bears a significantly positive relationship to civilian wages and occupational status for black men, but not for whites. One possible explanation for this result is that employers view military service as a type of "credential" in the case of blacks, but not for

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[2]This result could have been due to the possible selectivity bias discussed in Chapter III. For example, if white women, cet. par., place a higher value on home time then black women, this result is not surprising. See also p. 68.

whites. That is, civilian employers may use military service as a "screening" device for blacks--to connote basic ability, ambition, etc. On the other hand, a motivated black male may view military service as a valuable stepping-stone to a later civilian career.

High School Curriculum

Having been enrolled in a college-preparatory curriculum was a significant determinant of occupational status (except for black young women)--but it had no effect on hourly earnings. Young white men who were enrolled in this curriculum had greater 1971 tenure, while white young women with this background were more likely than their counterparts to have received post-school training, and less likely to have experienced unemployment between 1972 and 1973. The latter is also true for black young women.

It was expected that a high school background in vocational or commercial training would lead to greater labor market success, ceteris paribus. However, this expectation did not materialize in any significant way for the young men. The young women with this background, however, had significantly higher occupational prestige scores and more job tenure. In addition, this curriculum was a significant determinant of wages for white young women.

Geographic Variables

Residence in the South, a proxy for price level variations, had the expected statistically significant negative effect on wages for all groups. Residence in an SMSA, a proxy for the price level and demand conditions, was also significant (in the opposite direction)

in the wage equations, as well as for the occupational prestige levels (except for white young men). White men and women who lived in an SMSA were also significantly more likely to have received post-school training.

The Effect of Completing High School

The direct effect of schooling on the success measures is found by inspection of the schooling-related coefficients (i.e., GRAD, SCHOOLING, and GRDEXP) in the regression equations. In interpreting these coefficients, it is important to bear in mind that the reference group for most of the analysis is comprised of eleventh grade dropouts. Thus, the measure of the direct effect on each success measure of graduating from high school as compared with dropping out after completing the eleventh grade is:

$$\beta_1 + \beta_2 + c\beta_3$$

Where: β_1 is the regression coefficient attached to GRAD

β_2 is the coefficient associated with SCHOOLING (the graduates have completed one more year of high school)

c is the number of years of post-school labor market experience

β_3 is the regression coefficient on GRDEXP

To test statistically for the difference in success, an approximate t-test was performed on the above linear combination of regression coefficients.[3]

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[3]See Theil (1971), p. 131. The form of the t-statistic is as follows:

The method of calculating the indirect effects was described in the previous chapter. Because those effects are products of regression coefficients, a rigorous statistical test for significance is impracticable. Thus, for the purposes of this study a somewhat crude test was performed to determine "significance." An indirect effect is said to be "significant" only if all components of that effect are significant in their own right (at the .10 level in a two-tailed test). For example, the indirect effect of tenure on wage is equal to the product of the tenure coefficient in the wage equation and the schooling coefficient in the tenure equation.[4] Unless both coefficients are statistically significant, that indirect effect is not considered "significant."

The total effect of high school graduation on the success measures is the sum of schooling's direct effects plus its indirect effects. To test for the statistical significance of the total effects, reduced form equations were run (Tables 20-24 in Appendix A). The reduced form equations have as their independent variables all of the <u>exogenous</u> variables in the analysis--the endogenous variables (i.e., TRAINING and TENURE) are excluded. For example, the total effect of

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$$t = \frac{\beta_1 + \beta_2 + c\beta_3}{\sqrt{\begin{array}{l}\text{varGRAD} + 2\ \text{covGRAD, SCHOOLING} + \text{varSCHOOLING} + \\ 2c\ \text{covGRAD, GRDEXP} + 2c\ \text{covSCHOOLING, GRDEXP} + \\ c^2\ \text{varGRDEXP}\end{array}}}$$

[4]The "schooling coefficient" referred to here is actually the sum of three coefficients (GRAD, SCHOOLING, and GRDEXP) evaluated at a given level of experience. To determine the statistical significance of this linear combination, a t-test was performed. See footnote 3.

graduation on wages is the sum of the reduced form coefficients associated with GRAD, SCHOOLING, and GRDEXP. In all cases (with the exception of the incidence of unemployment--discussed later), the total effects derived in this manner were almost exactly equal to the total effects calculated on the basis of the recursive system. The advantage of the reduced form equations is that approximate t-statistics could be formed to test the total effects.[5] In the results which follow, the total effect is calculated from the recursive equations, and the t-statistic associated with the total effect is calculated from the reduced form equations.

The Effect of Schooling on Wages

The primary policy variables in the analysis are GRAD, SCHOOLING, GRDEXP, EXPERIENCE, TRAINING, and TENURE. As expected, TRAINING and TENURE are highly significant in explaining the level of wages (see Tables 8-11).[6] On the other hand, we find that GRAD, SCHOOLING, and GRDEXP--the three variables that measure the earnings differentials between graduates and eleventh grade dropouts--are in general not significantly different from zero when evaluated separately at one year of experience. However, at least one of these variables is significant in the TRAINING or TENURE equation, implying that graduation is likely to have an influence on wages indirectly, even if not directly.

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[5]The t-statistic in this case is formed analogously to the way it was formed to test direct effects--see footnote 3.

[6]The only exception is TRAINING in the case of young black women.

Table 12 summarizes the total, direct, and indirect effects of schooling on wages. The first thing one notices is the lack of any statistically significant total or direct schooling effect on wages after one year of experience. However, the total relative earnings advantage of high school graduates increases monotonically over time, attaining statistical significance for all four race-sex groups (but not until after nine years for white males).

The total effect of high school graduation on wages is greatest for the black young men, followed by the two female groups, and is least pronounced for the white young men. Thus, a high school diploma has differential effects for the various groups. Perhaps the black young men and, to a lesser extent, the young women have more to "prove" to potential employers than white males. That is, potential employers may be more likely to use a diploma as a screening device for the more "marginal" labor force groups.

About the same story can be told concerning the direct effect of education on earnings. In this case, only the black young men convert the last year of high school to significantly higher wages. Although schooling's direct effect on the three other cohorts increases over time in the expected direction, statistical significance is not attained. It should be noted that the results for white young men depend crucially on the reference group that is used, since each additional year of high school completed adds more than twenty-five cents per hour to the individual's 1971 wage. Table 13 shows how the direct wage impact of graduation varies depending upon the

Table 12: Total, Direct, and Indirect Effects of High School Graduation on Wages

Years of experience	Total effect/ t-value[a]	Direct effect/ t-value	Indirect effect through training	Indirect effect through tenure	Indirect effect through training/ tenure interaction
White young men					
1	-.104/-0.53	-.105/-0.53	.017[b]	-.017	.001
5	.027/ 0.19	-.021/-0.16	.031[b]	.016	.001
9	.156/ 1.12	.062/ 0.44	.043[b]	.049[b]	.002
13	.281/ 1.36*	.146/ 0.68	.052[b]	.081[b]	.002
Black young men					
1	.093/ 0.55	.106/ 0.62	-.008	-.005	.000
5	.277/ 2.11**	.245/ 1.95**	.027	.006	-.001
9	.451/ 2.82***	.385/ 2.47***	.052[b]	.016	-.002
13	.610/ 2.62***	.524/ 2.25**	.062[b]	.026	-.002
White young women					
1	-.089/-0.59	-.112/-0.78	.038[b]	-.012	-.003
5	.102/ 0.90	.026/ 0.24	.031[b]	.047[b]	-.002
9	.286/ 1.17**	.164/ 0.99	.019	.105[b]	-.002
13	.470/ 1.80**	.302/ 1.17	.005	.163[b]	.000
Black young women					
1	-.093/-0.60	-.076/-0.50	.000	-.017	.000
5	.103/ 0.83	.031/ 0.25	.003	.072[b]	-.003
9	.298/ 1.44*	.138/ 0.66	.005	.161[b]	-.006
13	.495/ 1.52*	.245/ 0.74	.006	.250[b]	-.006

a These t-values were calculated from the reduced form results presented in Tables 20-23. See text.
b "Significantly" different from zero. See p. 60.
* Significantly different from zero at the .10 level.
** Significantly different from zero at the .05 level.
*** Significantly different from zero at the .01 level.

dropout reference group. The three other race-sex groups do not exhibit any significant wage advantage of completing an additional year of high school, except, of course, completion of the twelfth grade for black males. Thus, the reference group phenomenon applies only to the white males. This evidence also tends to support the "screening" hypothesis discussed in Chapter II. For white males, years of schooling is more important; for black males and women, completion of high school is more important.

Table 13: Direct Effect of High School Graduation on Wages Compared to Three Different Reference Groups: White Young Men

Years of experience	11th grade dropouts	10th grade dropouts	9th grade dropouts
	Differences in hourly wage (t-value)	Differences in hourly wage (t-value)	Differences in hourly wage (t-value)
1	-.105 (-0.53)	.146 (0.78)	.397 (1.75)**
5	-.021 (-0.16)	.230 (2.06)**	.481 (2.86)***
9	.062 (0.44)	.313 (2.65)***	.564 (3.29)***
13	.146 (0.68)	.397 (2.00)**	.648 (2.78)***

Source: Calculated from Table 8.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

Turning to the indirect effects of graduation on wages, it is clear that the wage generating effect of schooling is manifested in large part through the greater likelihood of training and increased job tenure that graduates possess. Only in the case of the black young men are the total effects not substantially greater than the

direct contribution of schooling. In addition, it is noteworthy that while initially training contributes more to earnings than does tenure, the reverse is true after a few years (except for black young men). This finding is not surprising in light of the fact that training should be expected to have an immediate impact on wages, whereas for tenure to be effective it must be built up over time. For young black male graduates, tenure is no less important than for the other groups in raising wages; however, graduates are only slightly more likely than dropouts to have greater service with their 1971 employers.

A Rate-of-Return Analysis. Despite the limitations of rate-of-return calculations discussed in Chapter II, such calculations have been made. The design of this study permits two significant advantages over rate-of-return analyses based on census data. First, it is possible to control for the personal and environmental characteristics of the individuals in the sample; and, second, a measure of hourly rate of pay is used as the dependent variable instead of annual income data. On the other hand, the data used here have an important limitation that is not encountered by the users of census data--wage profiles are available only for a thirteen-year period.

The following assumptions underlie the rate of return calculations:

(1) The cost of completing the senior year in high school is equal to the annual earnings received by eleventh grade dropouts in their first year in the labor market.

(2) Annual earnings for a given year are equal to the wage rate for that year times 2,000 hours (i.e., the earnings are adjusted for full-time, full-year employment).

(3) All individuals work until they reach the age of 65.

(4a) The lower bound estimate is based on the assumption that the relative wage differential between high school graduates and dropouts remains constant (at the level of the thirteenth year of experience) between the fourteenth year of experience and the forty-seventh year.

(4b) The upper bound estimate is based on the assumption that the relative wage differential increases between the fourteenth year of experience and the forty-seventh year at the same rate that it increased in the initial thirteen year period.

Two sets of estimates have been made. The first comparison is between individuals with a high school diploma and those completing eleven years of school. This estimate shows the marginal internal rate of return to completing the twelfth grade. To permit comparison with studies having as the reference group individuals who have left school between grades nine and eleven, a second set of estimates uses as the reference group those persons who dropped out of school after the tenth year. In this case assumption (1) was amended to include as costs the foregone earnings of two years.

Table 14 presents the calculated internal rate of return estimates. These results are consistent with the conclusions drawn from the regression analysis. Focusing on the comparison of 12/11 years, black males and both groups of females receive substantial returns from completing high school. The conclusion regarding the white young men, however, is sensitive to the assumption concerning

the behavior of the relative earnings differential beyond thirteen years of experience. In any case, it is clear that a high school diploma has a greater impact on the relative earnings of females and black males than of white males.

Table 14: Internal Rate of Return Estimates

Cohort	Completion of 12 years over 11 years		Completion of 12 years over 10 years	
	Lower bound	Upper bound	Lower bound	Upper bound
White young men	4.9	8.0	7.0	8.7
Black young men	15.2	16.5	8.9	10.7
White young women	10.1	12.5	6.6	9.0
Black young women	11.0	13.3	6.4	9.1

The results are more ambiguous when one considers tenth grade dropouts as the reference group. It is noteworthy that the white male graduates are the only group to increase their relative lifetime earnings advantage when the comparison is with individuals dropping out of high school two years rather than one year before completion. This is the reflection of the earlier conclusion that years of schooling are the more important determinant of earnings for white males, while completion of high school is more important for black males and women. These results suggest that if a white male is determined to drop out of high school, it is economically rational for him (in terms of lifetime earnings) to complete as much schooling as possible, but that a woman or black male with a similar inclination would be better to leave school before completion of the eleventh

grade. However, the rates of return in Table 14, particularly in view of their crude nature, indicate that completing high school in any case is a fairly good investment.

The rates of return presented in Table 14 are, in general, lower than those found in other analyses (cf., Table 5, p. 24). Most likely, the reason for the disparity is the host of controls used in this study for the individual's personal and environmental characteristics. In addition, this study used standardized yearly earnings (i.e., annual earnings were adjusted to 2,000 hours worked per year). Eckaus (1973) also standardized earnings to 2,000 hours/year, although he had a less direct measure of hourly earnings than was used here. Eckaus found that the rate of return to graduating from high school (over 9-11 years) for white males was 5 percent after the earnings standardization, as compared with 30 percent before standardization. Thus, controlling for the work-leisure choice (i.e., standardizing earnings) and non-wage income substantially reduces the calculated rate of return to schooling.

The Selectivity Bias--A Caveat. As was previously mentioned, to be included in the analysis the individual must have had some employment in the two-year period prior to the 1971(3) survey. To the extent that a sample of recently employed women is not a random sample of all women, a selectivity bias exists that may have implications regarding the calculated returns to schooling.

Since the decision to work depends upon the individual's perception of the benefits of market work vis-a-vis nonmarket work

(or leisure), persons having low potential market earning power and those placing high values on home time are less likely than others to be in the sample. Thus, the sample will tend to underrepresent low-skilled workers, married women, and women with young children.[7] A further implication of the selectivity bias is that the relative wage advantage of schooling reported for the young women may be downwardly biased.[8,9] If we assume that an increase in education affects the wage-offer distribution more than it affects nonmarket productivity, then those women with higher educational levels will have higher labor force participation rates. The observed wage, however, increases more slowly than the mean wage offers. Thus, differences between the observed wages of working women in different

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[7]One way to approach the issue of the possible nonrandomness of the female sample is to compare the mean 1968 wages of the sample used in the study with the mean 1968 wages of those who were not employed between 1971 and 1973 to see if low-wage workers were more likely than others subsequently to drop out of the labor force. A substantial number of sample cases made this analysis practicable: of 670 white young women who had graduated from high school by 1967 and had been employed in that year, 271 were out of the labor force between 1971 and 1973. The comparable figures for black females were 221 and 83, respectively. The results were inconclusive: while the mean 1968 hourly wages for white women who later left the labor force were four cents less than for those women who remained in the labor force, the mean 1968 wages for black women favored 1971-73 labor force dropouts by six cents. Because of the insubstantial differences between the means, it does not appear that there are fundamental differences between women employed in the 1971-73 period and those not then employed.

[8]The analysis of occupational prestige and unemployment may be similarly affected.

[9]See Chapter III, p. 45.

educational categories tends to understate the difference between their mean wage offers and the estimated rate of return to education.[10]

Cross-Section Wage Effects

Because the cross-section wage effect of education may be sensitive to the prevailing economic conditions when the cross-section was taken (see Chapter II), the wage results for the young men are replicated for 1968 (Table 15). The year 1968 was chosen because the labor market in that year was relatively "tight," as opposed to the "loose" labor market in 1971. The wage results for the young women are not replicated, because 1973 (when their wage cross-section was taken) was an "average" labor market period.

The expectation is that high school dropouts will improve their position relative to graduates when the economic climate is favorable, because employers will relax their hiring standards to obtain manpower. The findings presented in Table 16 support that hypothesis. High school graduates, regardless of experience, never reach a level of earnings that are significantly greater than the dropouts. Indeed, none of the indirect effects of schooling are ever statistically significant. For whites, the effect of TRAINING and TENURE on wages is much weaker in 1968 than in 1971. However, as in 1971, years of schooling completed are significantly related to the level of 1968 wages for whites. For blacks, the effect of TENURE on wages is a little lower when measured in 1968, but the most interesting result

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[10] See Gronau (1974).

Table 15: 1968 Cross-Section Regression Results for Young Men

(t-values)

Explanatory variables[a]	WHITES			BLACKS		
	WAGE (1971 dollars)	TRAINING[b]	TENURE (months)	WAGE (1971 dollars)	TRAINING[b]	TENURE (months)
TRAINING	.111	...	.287	.284	...	-2.137
	(1.36)*		(0.17)	(2.33)***		(-0.64)
TENURE (months)	.001	...	...	.004	...	...
	(0.46)			(1.72)**		
GRAD	-.264	-.483	-8.342	-.045	-.168	-5.362
	(-1.20)	(-0.87)	(-1.81)	(-0.18)	(-0.18)	(-0.80)
SCHOOLING	.208	.456	5.178	.125	-.352	1.640
	(2.48)***	(1.94)**	(2.97)***	(1.43)*	(-1.08)	(0.68)
GRDEXP	.009	.096	1.536	.007	.148	.803
	(0.32)	(1.43)*	(2.78)***	(0.22)	(1.18)	(0.88)
EXPERIENCE	.060	-.062	2.093	.017	-.148	1.680
	(2.52)***	(-1.00)	(4.27)***	(0.70)	(-1.57)	(2.51)***
ABILITY	.024	.027	.390	-.002	.039	.042
	(3.99)***	(1.86)**	(3.13)***	(-0.25)	(1.46)*	(0.21)
GENERAL CURR. (ref.)	...	...	...	...	...	...
COLLEGE PREP. CURR.	-.080	.304	.563	-.125	.842	4.200
	(-0.70)	(1.18)	(0.23)	(-0.64)	(1.37)	(0.79)
VOC., COMM. CURR.	.003	-.009	.259	-.165	.123	2.419
	(0.03)	(-0.04)	(0.13)	(-1.42)	(0.30)	(0.77)
SES	.037	.100	-.809	.053	.097	.173
	(1.54)*	(1.78)**	(-1.64)	(1.76)**	(0.83)	(0.21)
HEALTH LIMITATIONS	-.197	-.591	-1.950	-.331	-1.179	-3.950
	(-1.65)**	(-1.87)**	(-0.78)	(-2.09)**	(-1.50)*	(-0.91)
MARRIED	.632	.606	3.872	.294	.679	6.626
	(7.44)***	(3.02)***	(2.19)**	(2.81)***	(1.81)**	(2.34)***
SOUTH	-.356	...	...	-.875	...	...
	(-4.24)***			(-8.10)***		
SMSA	.370	.261	.809	.181	.588	-3.828
	(4.85)***	(1.46)*	(0.51)	(1.57)*	(1.34)*	(-1.29)
MILITARY SERVICE (months)	-.006	.011	-.277	.013	-.002	-.113
	(-2.10)**	(1.64)	(-4.52)***	(2.25)**	(-0.09)	(-0.70)
CONSTANT	-.858	-7.983	-51.089	.951	.200	-10.027
	(-1.01)	(-3.26)	(-2.91)	(1.06)	(0.06)	(-0.41)
$\bar{R}^2$	.285	.107[c]	.256	.399	.074[c]	.102
Likelihood ratio test[d]	18.84***	76.28***	18.72***	12.37***	19.71*	3.25***
N	672	672	672	258	258	258
Mean of dep. vbl.	3.21	.34	22.72	2.54	.18	16.69
Std. dev. of dep. vbl.	1.12		22.95	.94		21.07
S.E.E.	.94		19.81	.73		19.96

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

is that the coefficient on years of schooling completed attained positive statistical significance in the 1968 wage equation, while the same variable is insignificant (in the negative direction) in the 1971 equation. Thus, years of schooling are more important to black male youth in relatively tight labor markets, while completion of high school credentials is more important in relatively poor labor markets. That is, there is less evidence of employers screening job applicants on the basis of educational credentials in periods of strong labor demand (as expected).

A rate-of-return analysis based on the 1968 data also showed that graduates lost a large part of their relative wage advantage over dropouts. The lower bound estimate for whites (completion of twelve years over eleven years) fell from 4.9 percent to only .5 percent, while the upper bound estimate fell from 8 percent to 4.4 percent. The returns to black graduates fell from 15.2 percent to 7.7 percent (lower bound) and from 16.5 percent to 10.2 percent (upper bound).

These findings are significant because most labor market studies (including this one) are based on cross-sectional data. The evidence presented here should act as a warning that conclusions based on cross-sections must be interpreted in the light of the prevailing economic conditions.

The Effect of Schooling on Occupational Prestige

As in the wage equations, TRAINING and TENURE are statistically significant determinants of success (except TENURE for black young

Table 16: Total, Direct, and Indirect Effects of High School Graduation on 1968 Wages: Young Men

Years of experience	Total effect/ t-value[a]	Direct effect/ t-value	Indirect effect through training	Indirect effect through tenure	Indirect effect through training/ tenure interaction
	White Young Men				
1	-.046/-0.24	-.047/-0.31	.002	-.001	.000
5	.003/ 0.01	-.013/-0.12	.012	.004	.000
9	.051/ 0.14	.022/ 0.14	.020	.009	.000
	Black Young Men				
1	.051/ 0.37	.088/ 0.52	-.025	-.012	.000
5	.134/ 0.95	.117/ 0.88	.016	.001	.000
9	.210/ 0.93	.147/ 0.71	.049	.014	.000

a These t-values were calculated from the reduced form results presented in Table 24. See text.

Note: No figure in the above table is statistically significant.

women--Tables 8-11). The remaining key variables--GRAD, SCHOOLING, and GRDEXP--are all statistically insignificant when evaluated separately in the white young men's equation, but at least one of those variables is independently significant for the other race-sex cohorts. In contrast to its behavior in the wage equations, the dummy variable denoting graduation (GRAD) is statistically significant in explaining occupational prestige for blacks. For white young women, the discrete education measure (SCHOOLING) is highly significant.

The total, direct, and indirect effects of schooling on occupational prestige are displayed in Table 17. While the direct impact of schooling is rather insignificant in explaining wages (except for black males), high school graduation bears a strong direct relationship to occupational prestige. Indeed, for the whites, the schooling effect grows stronger for each year of experience. The reverse is true for the black cohorts--the prestige effect of schooling declines over time, reaching statistical insignificance sometime after five years of experience.[11]

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[11]This result is paradoxical, particularly in view of the fact that the regression results imply that the absolute prestige scores decline over time for black graduates (although the decline is statistically insignificant)--despite increasing relative wage advantages over time for graduates. This finding is likely due to an artifact of the research design. Because "experience" is defined as 1971(3) minus year left school (a slightly different definition is used for females), individuals entering the labor market in the late 1960's make up the group of low-experience workers, while those leaving school in the late 1950's and early 1960's are the high-experience workers. Thus, it is possible that the affirmative action programs of the mid-to-late 1960's were manifested in large part

Table 17: Total, Direct, and Indirect Effects of High School Graduation on Duncan/Bose Index

Years of Experience	Total effect/ t-value[a]	Direct effect/ t-value	Indirect effect through training	Indirect effect through tenure	Indirect effect through training/ tenure interaction
			White young men		
1	1.46/ 0.48	1.36/ 0.49	.42	-.33	.01
5	3.74/ 1.95**	2.63/ 1.42*	.78[b]	.31	.02
9	5.98/ 3.04***	3.90/ 2.00**	1.09[b]	.96[b]	.03
13	8.15/ 2.76***	5.17/ 1.74**	1.34[b]	1.60[b]	.04
			Black young men		
1	4.79/ 1.80**	4.98/ 1.89**	- .16	- .03	.00
5	3.58/ 1.76**	3.00/ 1.54*	.56	.03	-.01
9	2.19/ 0.87	1.03/ 0.42	1.07[b]	.10	-.01
13	.46/ 0.21	- .95/-0.26	1.26[b]	.16	-.01
			White young women		
1	2.55/ 1.77**	2.12/ 1.46*	.47[b]	- .03	-.01
5	3.94/ 3.60***	3.45/ 2.08**	.37[b]	.13[b]	-.01
9	5.31/ 3.21***	4.78/ 2.88***	.23	.30[b]	.00
13	6.65/ 2.58***	6.12/ 2.35***	.06	.47[b]	.00
			Black young women		
1	4.45/ 2.24**	4.42/ 2.32**	.06	- .03	.00
5	2.54/ 1.66**	3.05/ 1.95**	- .61	.11	-.01
9	.87/ 0.33	1.67/ 0.64	-1.03[b]	.24	-.01
13	- .45/-0.21	.30/ 0.07	-1.12[b]	.38	-.01

a These t-values were calculated from the reduced form results presented in Tables 20-23. See text.
b "Significantly" different from zero. See p. 60.
* Significantly different from zero at the .10 level.
** Significantly different from zero at the .05 level.
*** Significantly different from zero at the .01 level.

Turning to the total effects of graduation, we note that they are, in general, not much different from the direct effects. Only in the case of white young men are the total effects substantially higher. As in the wage equations, training initially makes a larger contribution to success for the white males, but over time the increased relative amount of tenure is more important. However, the increased job tenure of graduates contributes little to the occupational prestige differential for the other three groups.

The higher probability that male graduates will receive post-school training, and the positive impact of training on job status, are reflected in Table 15. While training is also a significant determinant of occupational prestige for the young women, the female high school graduates lose their relative training advantage over time.

The Effect of Schooling on Incidence and Duration of Unemployment

Although the effect of TRAINING on both unemployment measures is statistically insignificant in all cases, TENURE is significant in the expected direction.[12] The effects of the three other major

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through employers hiring black graduates at higher occupational levels (or simply by reclassifying occupations), rather than by increasing wages. To test this hypothesis, the mean Duncan index score of the first job held (after leaving school) was calculated for black male graduates who left high school during the 1960's. The findings confirmed that black men who graduated after 1965 entered jobs having substantially higher prestige scores than those graduates who left school between 1960 and 1964 (16.5 versus 11.4).

[12]While it may appear that this relationship is little more than a tautology, it must be borne in mind that since TENURE refers to months of service on current or last job, it is possible to be currently unemployed and have a substantial amount of tenure.

variables--GRAD, SCHOOLING, and GRDEXP--are generally insignificant, except SCHOOLING for white young men.

Tables 18 and 19 present the total, direct, and indirect effects of graduation on the unemployment measures. Before discussing those results, a few words are in order concerning the discrepancies in the incidence of unemployment equations between the total effects as calculated from the recursive results, and the total effects as estimated by the reduced form equations. As was previously mentioned, only in these equations were the reduced form total effects substantially different from the recursive system total effects (which are found by summing the direct effect and the indirect effects). Conceptually, there is one difference in this study between the reduced form estimation and the recursive estimation. In the reduced form, the two binary variables (i.e., incidence of unemployment and training) take their actual values (either zero or one), whereas in the recursive system, these variables are defined as probability measures Interpreting training as a probability measure does little damage, as indicated by the matching total effects for the other success measures. However, in the incidence of unemployment equations, two of the three dependent variables are probability measures, causing a fairly wide divergence between the two sets of total effects.

For that reason, the two sets of total effects are included in Table 18. Because the reduced form total effects are more "true" than the recursive totals, the former are referred to in the remainder of 84

Table 18: Total, Direct, and Indirect Effects of High School Graduation on the Incidence of Unemployment

Years of experience	Total effect	Total effect/ t-value (reduced form)[a]	Direct effect/ t-value	Indirect effect through training	Indirect effect through tenure	Indirect effect through training/ tenure interaction
	White Young Men					
1	-.038	-.049/-0.57	-.079/-0.89	-.003	.046	-.002
5	-.095	-.071/-1.21	-.043/-0.68	-.005	-.044	-.003
9	-.151	-.092/-1.32*	-.006/-0.07	-.007	-.133[b]	-.005
13	-.216	-.112/-1.05	.032/ 0.39	-.009	-.233[b]	-.006
	Black Young Men					
1	-.100	-.080/-0.75	-.111/-0.93	-.003	.015	-.001
5	-.146	-.137/-1.84**	-.142/-1.63*	.011[b]	-.018	.003
9	-.193	-.181/-2.00**	-.168/-1.49*	.021[b]	-.051	.005
13	-.243	-.209/-1.70**	-.189/-1.16	.025[b]	-.085	.006
	White Young Women					
1	.062	.028/ 0.30	.015/ 0.15	.013	.027	.007
5	-.099	-.069/-0.94	-.006/-0.07	.010	-.109[b]	.006
9	-.262	-.151/-1.32*	-.027/-0.20	.006	-.245[b]	.004
13	-.425	-.203/-1.33*	-.047/-0.23	.002	-.381[b]	.001
	Black Young Women					
1	.063	.048/ 0.45	.028/ 0.25	.001	.035[b]	-.001
5	-.037	.037/ 0.35	.117/ 1.17	-.009	-.152[b]	.007
9	-.158	.020/ 0.11	.183/ 1.12	-.015	-.338[b]	.012
13	-.311	.006/ 0.02	.217/ 1.02	-.016	-.525[b]	.013

a See text for an explanation of the inclusion of two sets of total effects. These total effects and t-values were calculated from the reduced form results presented in Tables 20-23.
b "Significantly" different from zero. See p. 60.
* Significantly different from zero at the .10 level.
** Significantly different from zero at the .05 level.
*** Significantly different from zero at the .01 level.

Table 19: Total, Direct, and Indirect Effects of High School Graduation on the Duration of Unemployment

Years of Experience	Total effect/ t-value[a]	Direct effect/ t-value	Indirect effect through training	Indirect effect through tenure	Indirect effect through training/ tenure interaction
			White young men		
1	.94/ 0.77	.76/ 0.63	-.02	.21	-.01
5	.68/ 0.83	.93/ 1.16	-.04	- .20	-.01
9	.43/ 0.48	1.10/ 1.30	-.05	- .60[b]	-.02
13	.16/ 0.11	1.27/ 0.98	-.06	-1.02[b]	-.03
			Black young men		
1	-3.36/-1.61**	-3.42/-1.70**	-.02	.08	.00
5	-2.67/-1.75**	-2.68/-1.81**	.09	- .09	.01
9	-2.00/-1.06	-1.93/-1.05	.17	- .27	.03
13	-1.40/-0.47	-1.19/-0.43	.20	- .44	.03
			White young women		
1	- .67/-0.78	- .80/-0.93	.05	.06	.02
5	.15/ 0.23	.33/ 0.50	.04	- .23[b]	.01
9	.98/ 0.98	1.45/ 1.47	.03	- .51[b]	.01
13	1.78/ 1.16	2.57/ 1.67	.01	- .80[b]	.00
			Black young women		
1	- .63/-0.46	- .75/-0.55	.00	.12	.00
5	- .22/-0.19	.30/ 0.27	-.04	- .50[b]	.02
9	.21/ 0.11	1.35/ 0.72	-.07	-1.11[b]	.04
13	.63/ 0.21	2.40/ 0.81	-.08	-1.73[b]	.04

a These t-values were calculated from the reduced form results presented in Tables 20-23. See text.
b "Significantly" different from zero. See p. 60.
* Significantly different from zero at the .10 level.
** Significantly different from zero at the .05 level.
*** Significantly different from zero at the .01 level.

the text. Consequently, the indirect effects in Table 18 must be interpreted as very rough approximations.

The effect of schooling on unemployment experience is most pronounced for the black young men. For this group, high school graduation implies a significantly lower probability of becoming unemployed (Table 18). Indeed, for all groups (except black females) graduates are significantly less likely to become unemployed--and this advantage increases over time. Although the total effect of schooling also increases in the expected direction over time for black young women, this relationship is not statistically significant. Turning (with appropriate caution) to the indirect effects of schooling on the probability of unemployment, it appears that the increased tenure that graduates possess (except black males) is a strong determinant of their more favorable employment experience. However, the increased probability of receiving training appears to be of little help in lessening the relative incidence of unemployment for graduates.

While all but the black female graduates were, at some point on their experience profiles, significantly less likely to be unemployed, all except the white male graduates were likely, over time, to lose any relative advantage in terms of weeks of unemployment (Table 19). The white male graduates were, at all levels of experience, likely to be unemployed longer than the dropouts (although no figure was statistically significant). As in the case for the incidence of unemployment, post-school training was not "significant"

at any time for any race-sex group. However, the indirect effect of tenure on both measures of unemployment experience was "significant" in the expected direction for white males and both groups of females. One possible explanation for the graduates having more weeks of unemployment than dropouts is that the former may be less willing to accept "marginal" employment,[13] and/or are less likely to pull temporarily out of the labor force after experiencing a job loss.

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[13]That is, unemployment experience may be an investment in job search.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study has used a multivariate analysis to ascertain the extent to which graduation from high school confers labor market benefits on youth in terms of their earnings, occupational status, and unemployment experience. Given the diversity of dependent variables and the fact that separate analyses have been made of young men and young women of each racial group, it is perhaps not surprising that the evidence is somewhat mixed. Nevertheless, the findings point to substantial labor market benefits for all race-sex groups during the first decade or so of labor market experience.

While earnings differences between graduates and dropouts were generally not pronounced immediately upon leaving school, they became significant over the ensuing thirteen-year period--at least as measured in 1971(3). Thus, the age-earnings profiles of the graduates were steeper than those of the dropouts (Figure 3). The same generalization can be made with respect to occupational status in the case of male and female white youth; however, among blacks the difference in occupational status between graduates and dropouts actually shrank over time (Figure 4). For all groups of youth except the black females, graduates enjoyed a greater immunity to unemployment than dropouts, which widened over time. Among the black

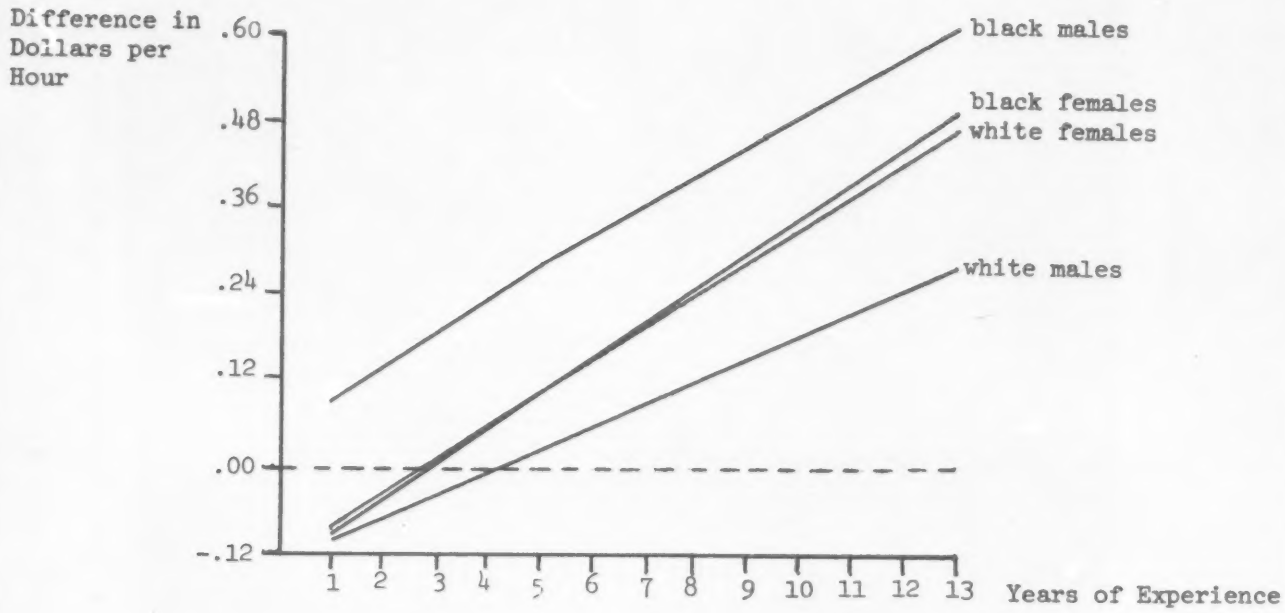

Figure 3: Wage Advantage Over Time of Graduates Relative to Dropouts

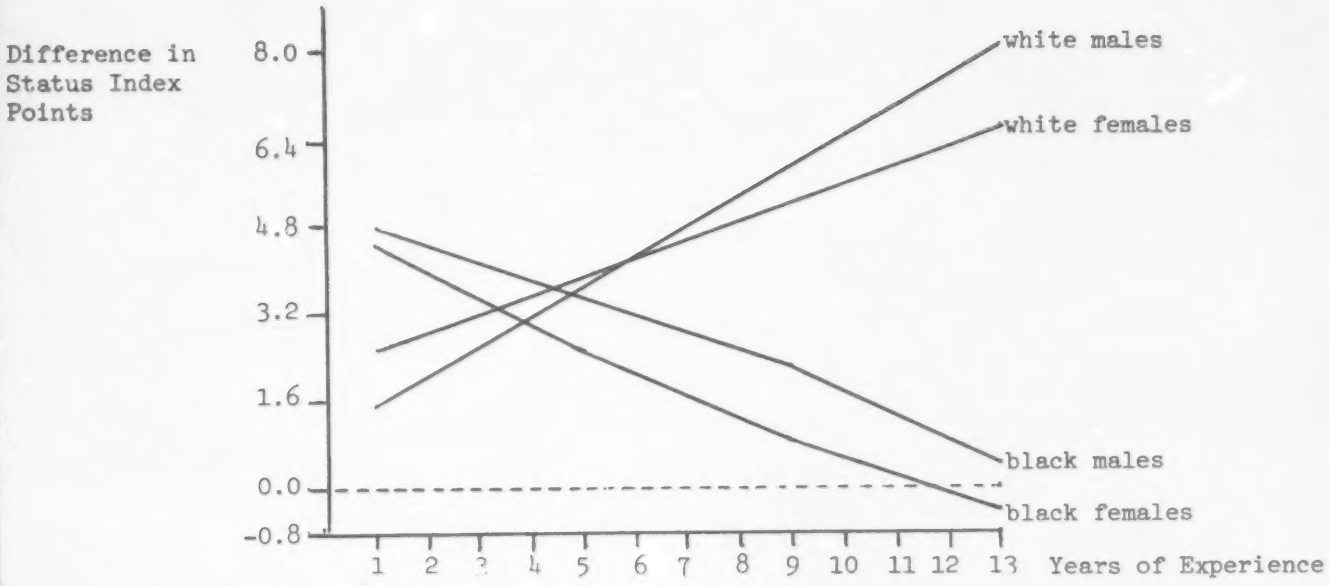

Figure 4: Occupational Status Advantage Over Time of Graduates Relative to Dropouts

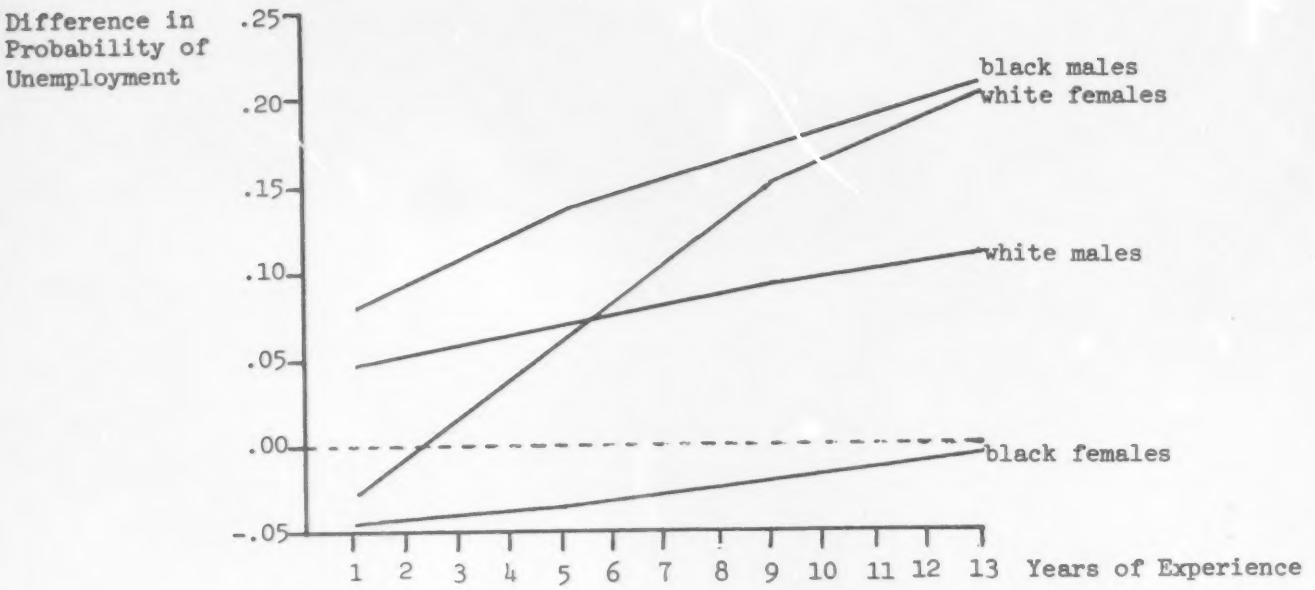

Figure 5: Decreased Likelihood of Unemployment Over Time of Graduates Relative to Dropouts

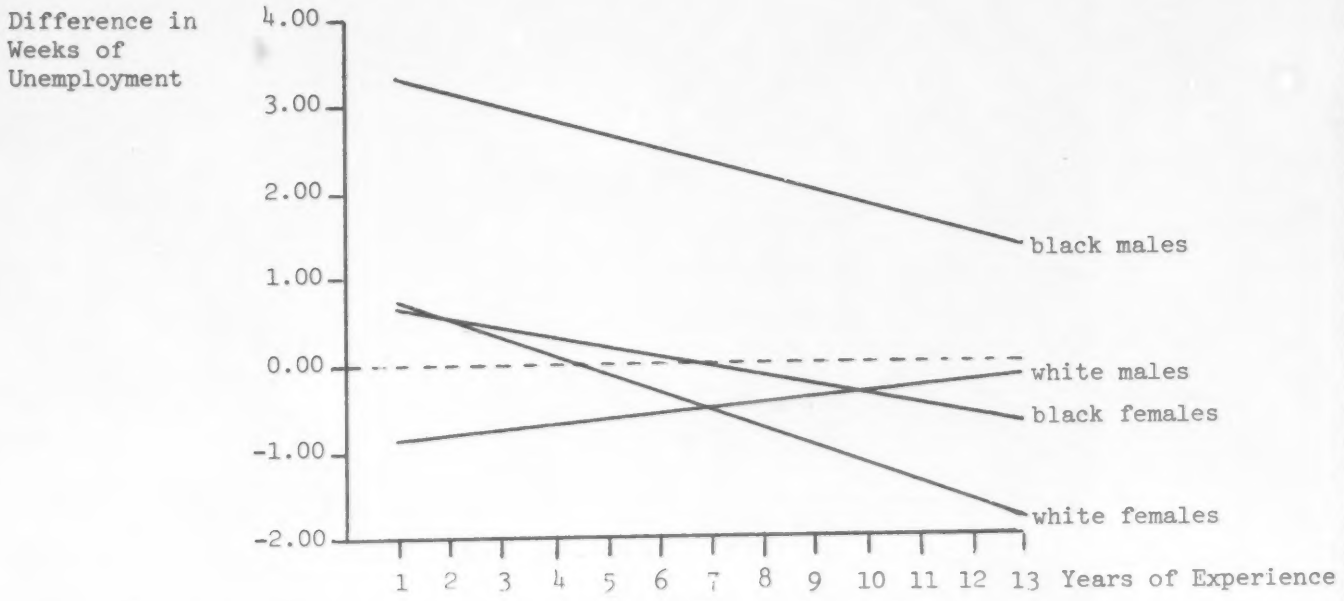

Figure 6: Decreased Duration of Unemployment Over Time of Graduates Relative to Dropouts

young women there was no appreciable difference (Figure 5). In the case of duration of unemployment, the early advantage of black male graduates and of both racial groups of women deteriorated over time (actually becoming negative for the female graduates), while there was little difference between white male graduates and dropouts (Figure 6).

The contribution of high school graduation to labor market success occurs in part indirectly, as the result of its influence on training and tenure. That is, high school graduates were more likely to have received post-school training and to have built up greater job tenure than dropouts. Because training and tenure have strong independent effects on success, the graduates substantially increased their advantage by greater investment in these types of post-school training activities. One of the contributions of this study has been the use of a recursive model that allows the measurement of these indirect effects of schooling. Although human capital theory acknowledges that human capital variables may be complementary in the "production" of success, a careful literature search has revealed no studies that have used a multi-equation approach for determining the source of the benefits of education. The findings of this study indicate that single-equation labor market success models are likely seriously to understate the return to education if training and tenure are held constant.

Finally, the evidence suggests that measured returns to high school graduation vary depending on the economic climate at the time the measurement is made. Wage differences between male graduates and

dropouts were analyzed for both 1968 (a relatively tight labor market) and 1971 (a relatively poor year). As expected, the position of dropouts relative to graduates was substantially better in the tight labor market than in the loose market of 1971. The effect of education, which was a significant determinant of earnings in 1971 for the male youth, was found to be statistically insignificant when measured in 1968. Presumably, employers relax hiring standards in a tight labor market, which decreases the relative advantage accruing to holders of high school diplomas.

The same phenomenon is reflected in the rate-of-return calculations based on the 1968 wage data--the results were far different from those of a similar analysis based on 1971 data. The lower bound estimate of the internal rate of return for whites (completion of twelve years as compared with eleven years) fell from 4.9 percent to only .5 percent, while the upper bound estimate fell from 8 percent to 4.4 percent. The return to blacks fell from 15.2 percent to 7.7 percent (lower bound) and from 16.5 percent to 10.2 percent (upper bound). These findings are significant because most labor market studies (including this one) are based on cross-sectional data. The evidence presented here should act as a warning that conclusions based on cross-sections must be interpreted in light of the prevailing economic conditions.

Several of these findings have implications for labor market policy. First, it appears that "stay-in-school" campaigns are well-founded. Most of the findings support the proposition that

schooling improves the chances for labor market success. Second, while schooling, per se, has a positive impact on success, education's positive influence on post-school training and length of job tenure also considerably increases the probability of success. Thus, human resource policy may be made more effective by encouraging dropouts to receive training and/or by encouraging greater job tenure by making these individuals more attractive to employers. To the extent that employers and/or training program administrators ration training opportunities on the basis of educational attainment, human resource policy should also be directed toward removal of these barriers. On the other hand, theory (and some empirical evidence) suggests that high school graduates receive a higher return than dropouts on these post-school investments because of the former's better foundation. To the extent that this is true, training and tenure may not be so highly beneficial to dropouts.[1] Further investigation of this relationship is one direction for future research.

Finally, there is evidence that the contribution of education to earnings is not linear (at least in a loose labor market); specifically, that completion of the twelfth year and receipt of a diploma confers a greater advantage than completing any other single year of high school--except for white males. That is, while the years-of-schooling variable is the more important determinant of

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[1]See Kruse (1977).

earnings for white males, completion of high school is more important for black males and both racial groups of young women. For the latter three groups there is a substantial discontinuity over time in the return to education at twelve years. This suggests that employers may use the high school diploma as a screening device for these groups. Interestingly, there is no evidence to support the screening hypothesis when the wage measurements were made for the male youth during the tight labor market of 1968. Again, the probable reason for this result is that employers relax hiring standards during periods of high labor demand, reducing the relative advantage of the degree-holders.

However, it must be acknowledged that the screening effect cannot be rigorously tested with the data available in this study. A rigorous test would require one to examine the schooling process as well as employer hiring practices to see whether skill-creation occurs more rapidly in the final year of school or whether employers simply use successful completion of schooling to screen job applicants for what they believe to be desirable personal characteristics (e.g., motivation, ability, docility, etc.). From the viewpoint of the individual, the difference is academic; those with high school diplomas are more likely to be employed at higher wages. However, from the viewpoint of public policy the difference is significant. If schooling is only a screening device, educational expansion is unlikely to have much impact on earnings because an increased flow

of graduates will simply promote upgrading of hiring standards.[2] A more direct test of the existence of screening is another direction for future research.

As much of the discussion in the previous chapters has made clear, estimating the net effects of schooling on labor market experience is beset with methodological difficulties, and such estimates must therefore be accepted with caution. For example, the omission of variables that are correlated positively with both educational attainment and labor market success would lead to an upward bias in the estimated return to education. Nevertheless, the evidence adduced in this study seems to the author to warrant the belief that there are considerable labor market advantages accruing to high school completion. Three of the four success measures that have been investigated (i.e., wages, occupational prestige, and incidence of unemployment) support (in varying degrees) the contention that a high school diploma is "worth it." Furthermore, it should be emphasized that the results presented here are most likely conservative, despite the possibility of omitted variables. For example, individuals who attended college were excluded from the analysis. The option to attend college, of course, exists only for high school graduates. Thus, a very important advantage of a high school education has been completely ignored. In addition, the analysis has dealt only with the investment side of education; no attention has

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[2]See Blaug (1976).

been paid to consumption benefits. While consumption may have little bearing on the labor market returns to schooling, it is certainly not irrelevant to the overall investment decision.[3] Finally, the labor market success variables that have been investigated are not exhaustive. To take only one example, job satisfaction (i.e., nonpecuniary returns) is a significant facet of the total labor market experience, but has not been included among the measured benefits of high school graduation.[4]

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[3]On the other hand, the consumption value may be negative. See Lazear (1977).

[4]Lucas (1977) found that "...[there is a] considerable downward bias from estimating such [educational] returns in terms of monetary returns alone. In essence, this result follows from the inference that the pecuniary fraction of total compensation is a declining function of schooling for all race/sex groups (p. 557)."

APPENDIX A

Reduced Form Regression Results

Table 20: 1971 Cross-Section Regression Results for White Young Men: Reduced Form

(t-values)

Explanatory variables[a]	Dependent variables			
	WAGE (1971 dollars)	DUNCAN INDEX	INCIDENCE OF UNEMPLOYMENT[b]	DURATION OF UNEMPLOYMENT
TRAINING				
TENURE (months)				
GRAD	-.432	-1.320	.252	2.820
	(-1.57)	(-0.34)	(0.52)	(1.67)
SCHOOLING	.291	2.122	-.429	-1.801
	(2.82)***	(1.44)*	(-2.32)**	(-2.84)***
GRDEXP	.033	.584	-.023	-.067
	(1.20)	(1.49)*	(-0.43)	(-0.40)
EXPERIENCE	.084	-.120	-.123	-.188
	(3.37)***	(-0.34)	(-2.67)***	(-1.23)
ABILITY	.018	.481	.002	.020
	(2.87)***	(5.33)***	(0.19)	(0.50)
GENERAL CURR. (ref.)				
COLLEGE PREP. CURR.	.048	4.963	-.174	.450
	(0.41)	(2.96)***	(-0.77)	(0.62)
VOC., COMM. CURR.	-.047	-.216	.171	.837
	(-0.47)	(-0.15)	(0.90)	(1.35)
SES	.035	1.013	.098	.345
	(1.40)*	(2.86)***	(2.07)	(2.26)
HEALTH LIMITATIONS	-.239	-4.030	.422	2.172
	(-1.71)**	(-2.02)**	(1.71)**	(2.53)***
MARRIED	.565	4.704	-.433	-1.981
	(6.34)***	(3.71)***	(-2.69)***	(-3.62)***
SOUTH	-.549			
	(-6.11)***			
SMSA	.519	1.190	-.155	.019
	(6.22)***	(1.02)	(-1.00)	(0.04)
MILITARY SERVICE (months)	-.004	-.028	.011	-.003
	(-1.34)	(-0.69)	(1.98)**	(-0.15)
CONSTANT	-1.558	-23.084	3.667	20.067
	(-1.46)	(-1.53)	(1.94)	(3.08)
$\bar{R}^2$	.252	.123	.071[c]	.046
Likelihood ratio test[d]	27.33***	12.94***	75***	5.08***
N	1018	1018	1018	1018
Mean of dep. vbl.	3.47	30.20	.26	3.07
Std. dev. of dep. vbl.	1.45	19.12		7.91
S.E.E.	1.26	17.90		7.72

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

Table 21: 1971 Cross-Section Regression Results for Black Young Men: Reduced Form

(t-values)

Explanatory variables[a]	Dependent variables			
	WAGE (1971 dollars)	DUNCAN INDEX	INCIDENCE OF UNEMPLOYMENT[b]	DURATION OF UNEMPLOYMENT
TRAINING				
TENURE (months)				
GRAD	.044	4.977	-.401	-3.921
	(0.18)	(1.34)*	(-0.65)	(-1.36)*
SCHOOLING	.008	.211	.139	.389
	(0.09)	(0.15)	(0.61)	(0.36)
GRDEXP	.044	-.341	-.067	.169
	(1.65)**	(-0.83)	(-0.92)	(0.53)
EXPERIENCE	.006	.021	-.077	-.317
	(0.26)	(0.07)	(-1.38)*	(-1.26)
ABILITY	.008	.182	-.013	.055
	(1.17)	(1.74)**	(-0.73)	(0.67)
GENERAL CURR. (ref.)				
COLLEGE PREP. CURR.	-.082	5.974	.388	1.089
	(-0.50)	(2.37)**	(0.94)	(0.55)
VOC., COMM. CURR.	.072	-.499	.163	1.684
	(0.66)	(-0.30)	(0.59)	(1.31)
SES	.101	.037	-.032	.028
	(3.53)***	(0.09)	(-0.44)	(0.08)
HEALTH LIMITATIONS	-.399	-4.410	.826	5.274
	(-2.29)**	(-1.65)**	(1.92)**	(2.53)***
MARRIED	.295	3.942	-.878	-4.386
	(3.23)***	(2.83)***	(-3.80)***	(-4.05)***
SOUTH	-.683			
	(-7.06)***			
SMSA	.271	2.571	.485	.640
	(2.51)***	(1.62)*	(1.77)	(0.52)
MILITARY SERVICE (months)	.008	.132	.030	.057
	(1.94)*	(2.21)**	(2.99)***	(1.22)
CONSTANT	1.496	6.472	-.934	3.525
	(1.59)	(0.45)	(-0.40)	(0.32)
$\bar{R}^2$	.312	.075	.128[c]	.066
Likelihood ratio test[d]	15.84***	3.86***	59***	3.52***
N	426	426	426	426
Mean of dep. vbl.	2.72	20.07	.37	5.2[illegible]
Std. dev. of dep. vbl.	1.04	13.81		10.69
S.E.E.	.86	13.29		10.33

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

Table 22: 1973 Cross-Section Regression Results for White Young Women: Reduced Form

(t-values)

Explanatory variables[a]	Dependent variables			
	WAGE (1971 dollars)	BOSE INDEX	INCIDENCE OF UNEMPLOYMENT[b]	DURATION OF UNEMPLOYMENT
TRAINING				
TENURE (months)				
GRAD	-.170	-.593	.298	-.361
	(-0.75)	(-0.26)	(0.52)	(-0.27)
SCHOOLING	.037	2.822	-.089	-.516
	(0.38)	(2.88)***	(-0.36)	(-0.89)
GRDEXP	.047	.345	-.098	.206
	(1.67)**	(1.24)	(-1.19)	(1.24)
EXPERIENCE	.084	.269	-.126	-.443
	(3.36)***	(1.08)	(-1.77)**	(-2.99)***
ABILITY	.004	.085	.002	.035
	(1.27)	(2.56)**	(0.25)	(1.77)
GENERAL CURR. (ref.)				
COLLEGE PREP. CURR.	.157	1.784	-.553	-.394
	(1.91)*	(2.19)**	(-2.32)**	(-0.81)
VOC., COMM. CURR.	.155	1.967	-.285	-.312
	(2.21)**	(2.84)***	(-1.46)*	(-0.76)
SES	.036	1.099	.018	.075
	(2.01)**	(6.15)***	(0.37)	(0.70)
HEALTH LIMITATIONS	-.290	-.214	.244	1.752
	(-2.42)***	(-0.18)	(0.77)	(2.46)***
MARRIED	.071	1.058	-.217	-.728
	(1.05)	(1.57)	(-1.19)	(-1.82)*
CHILDREN ≤ 6	-.224	-1.299	-.005	-.138
	(-3.52)***	(-2.04)**	(-0.03)	(-0.36)
SOUTH	-.174			
	(-2.65)***			
SMSA	.239	2.103	-.035	-.437
	(3.82)***	(3.42)***	(-0.21)	(-1.19)
CONSTANT	.947	-6.274	.392	8.234
	(0.92)	(-0.61)	(0.15)	(1.35)
$\bar{R}^2$	.177	.187	.055[c]	.026
Likelihood ratio test[d]	17.08***	19.64***	55***	3.14***
N	972	972	972	972
Mean of dep. vbl.	2.42	45.48	.21	1.78
Std. dev. of dep. vbl.	1.00	10.03		5.46
S.E.E.	.91	9.04		5.39

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

Table 23: 1973 Cross-Section Regression Results for Black Young Women: Reduced Form

(t-values)

Explanatory variables[a]	Dependent variables			
	WAGE (1971 dollars)	BOSE INDEX	INCIDENCE OF UNEMPLOYMENT[b]	DURATION OF UNEMPLOYMENT
TRAINING				
TENURE (months)				
GRAD	-.132	3.209	.226	-1.682
	(-0.58)	(1.11)	(0.35)	(-0.82)
SCHOOLING	-.010	1.597	-.017	.938
	(-0.10)	(1.34)*	(-0.06)	(1.11)
GRDEXP	.049	-.436	-.014	.105
	(1.47)*	(-1.03)	(-0.12)	(0.35)
EXPERIENCE	.002	.428	-.273	-.719
	(0.08)	(1.24)	(-2.79)***	(-2.94)***
ABILITY	.012	.121	.007	.024
	(3.03)***	(2.43)***	(0.59)	(0.69)
GENERAL CURR. (ref.)				
COLLEGE PREP. CURR.	.131	1.414	-.855	-1.624
	(0.90)	(0.77)	(-1.94)*	(-1.25)
VOC., COMM. CURR.	.140	3.960	-.530	-1.503
	(1.29)*	(2.89)***	(-1.62)*	(-1.55)*
SES	.078	1.001	-.032	-.260
	(3.10)***	(3.16)***	(-0.44)	(-1.16)
HEALTH LIMITATIONS	-.254	-2.666	.499	-.440
	(-1.61)*	(-1.34)*	(1.15)	(-0.31)
MARRIED	.127	.641	.375	-.398
	(1.41)	(0.57)	(1.46)	(-0.50)
CHILDREN ≤ 6	-.150	-3.055	-.318	-.389
	(-1.66)**	(-2.68)***	(-1.22)	(-0.48)
SOUTH	-.616			
	(-6.57)***			
SMSA	.185	4.908	.204	.658
	(1.89)**	(4.08)***	(0.75)	(0.77)
CONSTANT	1.632	3.956	.343	-2.054
	(1.65)	(0.32)	(0.12)	(-0.23)
$\bar{R}^2$	.284	.224	.100[c]	.036
Likelihood ratio test[d]	12.21***	9.86***	39***	2.13***
N	369	369	369	369
Mean of dep. vbl.	2.31	39.17	.30	2.83
Std. dev. of dep. vbl.	.95	11.56		7.34
S.E.E.	.81	10.18		7.21

a See text for a description of these variables.
b Estimated by logit equation.
c Pseudo R^2.
d For the two logit equations, an asymptotic chi-square test was performed. An F-test was performed on the other dependent variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

Table 24: 1968 Cross-Section Regression Results for Young Men: Reduced Form

(t-values)

Explanatory variables[a]	White Young Men	Black Young Men
	WAGE (1971 dollars)	WAGE (1971 dollars)
TRAINING	-.279	-.071
	(-1.27)	(-0.29)
TENURE (months)	.219	.117
	(2.64)***	(1.33)*
GRAD	.012	.017
	(0.47)	(0.49)
SCHOOLING	.060	.018
	(2.57)***	(0.75)
EXPERIENCE	.025	-.0002
	(4.18)***	(-0.02)
ABILITY		
GENERAL CURR. (ref.)		
COLLEGE PREP. CURR.	-.072	-.073
	(-0.63)	(-0.37)
VOC., COMM. CURR.	.003	-.152
	(0.03)	(-1.30)
SES	.038	.057
	(1.61)*	(1.86)**
HEALTH LIMITATIONS	-.211	-.381
	(-1.77)**	(-2.39)***
MARRIED	.649	.347
	(7.73)***	(3.34)***
SOUTH	-.355	-.893
	(-4.23)***	(-8.18)***
SMSA	.377	.160
	(4.95)***	(1.56)*
MILITARY SERVICE (months)	-.006	.013
	(-2.13)**	(2.11)**
CONSTANT	-.989	1.061
	(-1.17)	(1.17)
$\bar{R}^2$	.285	.384
F-ratio	21.58***	13.33***
N	672	258
Mean of dep. vbl.	3.21	2.54
Std. dev. of dep. vbl.	1.12	.94
S.E.E.	.94	.74

a See text for a description of these variables.
* Significant at the .10 level.
** Significant at the .05 level.
*** Significant at the .01 level.

APPENDIX B

Knowledge of the World of Work Tests

H. KNOWLEDGE OF THE WORLD OF WORK -- young men

67. I'd like your opinion about the kind of work that men in certain jobs usually do. For each occupation on this card *(Show Flashcard 1)* there are three descriptions of job duties. Will you please tell me which description you think best fits each job? Be sure to read all of the possible answers before you decide.

A-1. HOSPITAL ORDERLY

1 ☐ Helps to take care of hospital patients
2 ☐ Orders food and other supplies for hospital kitchens
3 ☐ Works at hospital desk where patients check in
4 ☐ Don't know – *SKIP to B-1*

A-2. How much regular schooling do you think hospital orderlies usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

B-1. MACHINIST

1 ☐ Makes adjustments on automobile, airplane, and tractor engines
2 ☐ Repairs electrical equipment
3 ☐ Sets up and operates metal lathes, shapers, grinders, buffers, etc.
4 ☐ Don't know – *SKIP to C-1*

B-2. How much regular schooling do you think machinists usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

C-1. ACETYLENE WELDER

1 ☐ Builds wooden crates to hold tanks of acetylene gas
2 ☐ Uses a gas torch to cut metal or join pieces of metal together
3 ☐ Operates a machine that stitches the soles to the upper parts of shoes
4 ☐ Don't know – *SKIP to D-1*

C-2. How much regular schooling do you think acetylene welders usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

D-1. STATIONARY ENGINEER

1 ☐ Works at a desk, making drawings and solving engineering problems
2 ☐ Drives a locomotive that moves cars around in a freight yard
3 ☐ Operates and maintains such equipment as steam boilers and generators
4 ☐ Don't know – *SKIP to E-1*

D-2. How much regular schooling do you think stationary engineers usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

E-1. STATISTICAL CLERK

1 ☐ Makes calculations with an adding machine or a calculator
2 ☐ Sells various kinds of office machines and office supplies
3 ☐ Collects tickets at sports events and other types of entertainment
4 ☐ Don't know – *SKIP to F-1*

E-2. How much regular schooling do you think statistical clerks usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

F-1. FORK LIFT OPERATOR

1 ☐ Operates a machine that makes a certain kind of agricultural tool
2 ☐ Operates a freight elevator in a warehouse or factory
3 ☐ Drives an electrical or gas powered machine to move material in a warehouse or factory
4 ☐ Don't know – *SKIP to G-1*

F-2. How much regular schooling do you think folk lift operators usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

G-1. ECONOMIST

1 ☐ Prepares menus in a hospital, hotel, or other such establishment
2 ☐ Does research on such matters as general business conditions, unemployment, etc.
3 ☐ Assists a chemist in developing chemical formulas
4 ☐ Don't know – *SKIP to H-1*

G-2. How much regular schooling do you think economists usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

H. KNOWLEDGE OF THE WORLD OF WORK – Continued -- young men

67. H-1. MEDICAL ILLUSTRATOR

1 ☐ Hands tools and equipment to a surgeon during an operation
2 ☐ Demonstrates the use of various types of medicines
3 ☐ Draws pictures that are used to teach anatomy and surgical operating procedures
4 ☐ Don't know – *SKIP to I-1*

H-2. How much regular schooling do you think medical illustrators usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

I-1. DRAFTSMAN

1 ☐ Makes scale drawings of products or equipment for engineering or manufacturing purposes
2 ☐ Mixes and serves drinks in a bar or tavern
3 ☐ Pushes or pulls a cart in a factory or warehouse
4 ☐ Don't know – *SKIP to J-1*

I-2. How much regular schooling do you think draftsmen usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

J-1. SOCIAL WORKER

1 ☐ Works for a welfare agency and helps people with various types of problems they may have
2 ☐ Conducts research on life in primitive societies
3 ☐ Writes newspaper stories on marriages, engagements, births, and similar events
4 ☐ Don't know – *SKIP to 68*

J-2. How much regular schooling do you think social workers usually have?

1 ☐ Less than a high school diploma
2 ☐ A high school diploma
3 ☐ Some college
4 ☐ College degree
5 ☐ Don't know

Now I'd like your opinion on whether people in certain occupations earn more, on the average, than people in other occupations. By average, we mean the average of all men in this occupation in the entire United States.

69. Who do you think earns more in a year; a man who is:

a. 1 ☐ An automobile mechanic ..... or 2 ☐ An electrician? ..... 0 ☐ Don't know

b. 1 ☐ A medical doctor ..... or 2 ☐ A lawyer? ..... 0 ☐ Don't know

c. 1 ☐ An aeronautical engineer ..... or 2 ☐ A medical doctor? ..... 0 ☐ Don't know

d. 1 ☐ A truck driver ..... or 2 ☐ A grocery store clerk? ..... 0 ☐ Don't know

e. 1 ☐ An unskilled laborer in a steel mill .... or 2 ☐ An unskilled laborer in a shoe factory? .. 0 ☐ Don't know

f. 1 ☐ A lawyer ..... or 2 ☐ A high school teacher? ..... 0 ☐ Don't know

g. 1 ☐ A high school teacher ..... or 2 ☐ A janitor? ..... 0 ☐ Don't know

h. 1 ☐ A janitor ..... or 2 ☐ A policeman? ..... 0 ☐ Don't know

While answering Section H was another person present?

☐ Yes ☐ No – *Go to Section I*

Would you say this person influenced the respondent's answers?

☐ Yes ☐ No

V. KNOWLEDGE OF THE WORLD OF WORK -- young women

61. I'd like your opinion about the kind of work that women in certain jobs usually do. For each occupation on this card *(hand card to respondent)* there are three descriptions of job duties. Will you please tell me which description you think best fits each job? Be sure to read all of the possible answers before you decide.

A. ASSEMBLER

1 ☐ Puts together and fixes machines used on an assembly line

2 ☐ Takes broken parts off an assembly line and sends them to scrap area

3 ☐ Works on a production line putting parts together

4 ☐ Don't know

B. KEYPUNCH OPERATOR

1 ☐ Operates a machine which sends telegrams

2 ☐ Operates a machine which punches holes in cards used in computers

3 ☐ Operates a cordless telephone switchboard and pushes switch keys to make telephone connections

4 ☐ Don't know

C. BANK TELLER

1 ☐ Checks bank records

2 ☐ Talks to persons who want to borrow money

3 ☐ Receives and pays out money in a bank

4 ☐ Don't know

D. DEPARTMENT STORE BUYER

1 ☐ Selects the items to be sold in a section of a department store

2 ☐ Checks on the courtesy of sales people by shopping at the store

3 ☐ Buys department stores that are about to go out of business

4 ☐ Don't know

E. DIETICIAN

1 ☐ Waits on tables in a restaurant

2 ☐ Suggests exercises for persons who are overweight or sick

3 ☐ Plans menus for hospitals and schools

4 ☐ Don't know

V. KNOWLEDGE OF THE WORLD OF WORK – Continued-- young women

61. Continued

F. STATISTICAL CLERK

1 ☐ Solves business problems using a computer

2 ☐ Makes calculations with adding machines or a desk calculator

3 ☐ Prepares bills and statements for customers

4 ☐ Don't know

G. NURSES' AID

1 ☐ Teaches nurses how to take care of patients

2 ☐ Tests blood samples of hospital patients

3 ☐ Serves food to hospital patients and performs other duties to make patients comfortable

4 ☐ Don't know

H. SOCIAL WORKER

1 ☐ Conducts research on life in primitive societies

2 ☐ Writes newspaper stories on marriages, engagements, births, and similar events

3 ☐ Works for a welfare agency and helps people with various types of problems they may have

4 ☐ Don't know

I. MEDICAL ILLUSTRATOR

1 ☐ Draws pictures of medical uniforms for use in ads

2 ☐ Teaches medical students correct operating procedures

3 ☐ Draws pictures that are used to teach anatomy and surgical operating procedure

4 ☐ Don't know

J. QUALITY CONTROL GIRL IN BAKERY

1 ☐ Finds out if packages of pastries are the proper weight

2 ☐ Tells bakers what to do

3 ☐ Keeps records of how much bread is sold

4 ☐ Don't know

While answering Section V, was another person present?

1 ☐ Yes 2 ☐ No – *Go to 62*

Would you say this person influenced the respondent's answers?

1 ☐ Yes 2 ☐ No

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The Center for Human Resource Research

The Center for Human Resource Research is a policy-oriented research unit based in the College of Administrative Science of The Ohio State University. Established in 1965, the Center is concerned with a wide range of contemporary problems associated with human resource development, conservation and utilization. The personnel include approximately twenty senior staff members drawn from the disciplines of economics, education, health sciences, industrial relations, management science, psychology, public administration, social work and sociology. This multidisciplinary team is supported by approximately 50 graduate research associates, full-time research assistants, computer programmers and other personnel.

The Center has acquired pre-eminence in the fields of labor market research and manpower planning. The National Longitudinal Surveys of Labor Force Behavior have been the responsibility of the Center since 1965 under continuing support from the United States Department of Labor. Staff have been called upon for human resource planning assistance throughout the world with major studies conducted in Bolivia, Ecuador and Venezuela, and recently the National Science Foundation requested a review of the state of the art in human resource planning. Senior personnel are also engaged in several other areas of research including collective bargaining and labor relations, evaluation and monitoring of the operation of government employment and training programs and the projection of health education and facility needs.

The Center for Human Resource Research has received over one million dollars annually from government agencies and private foundations to support its research in recent years. Providing support have been the U.S. Departments of Labor, State, and Health, Education and Welfare; Ohio's Health and Education Departments and Bureau of Employment Services; the Ohio cities of Columbus and Springfield; the Ohio AFL-CIO; and the George Gund Foundation. The breadth of research interests may be seen by examining a few of the present projects.

The largest of the current projects is the National Longitudinal Surveys of Labor Force Behavior. This project involves repeated interviews over a fifteen year period with four groups of the United States population: older men, middle-aged women, and young men and women. The data are collected for 20,000 individuals by the U.S. Bureau of the Census, and the Center is responsible for data analysis. To date dozens of research monographs and special reports have been prepared by the staff. Responsibilities also include the preparation and distribution of data tapes for public use. Beginning in 1979, an additional cohort of 12,000 young men and women between the ages of 14 and 21 will be studied on an annual basis for the following five years. Again the Center will provide analysis and public use tapes for this cohort.

The Quality of Working Life Project is another ongoing study operated in conjunction with the cities of Springfield and Columbus, in an attempt to improve both the productivity and the meaningfulness of work for public employees in these two municipalities. Center staff serve as third party advisors, as well as researchers, to explore new techniques for attaining management-worker cooperation.

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A third area of research in which the Center has been active is manpower planning both in the U.S. and in developing countries. A current project for the Ohio Advisory Council for Vocational Education seeks to identify and inventory the highly fragmented institutions and agencies responsible for supplying vocational and technical training in Ohio. These data will subsequently be integrated into a comprehensive model for forecasting the State's supply of vocational and technical skills.

Another focus of research is collective bargaining. In a project for the U.S. Department of Labor, staff members are evaluating several current experiments for "expedited grievance procedures," working with unions and management in a variety of industries. The procedural adequacies, safeguards for due process, cost and timing of the new procedure are being weighed against traditional arbitration techniques.

Senior staff also serve as consultants to many boards and commissions at the national and state level. Recent papers have been written for the Joint Economic Committee of Congress, The National Commission for Employment and Unemployment Statistics, The National Commission for Manpower Policy, The White House Conference on the Family, the Ohio Board of Regents, the Ohio Governor's Task Force on Health, and the Ohio Governor's Task Force on Welfare.

The Center maintains a working library of approximately 6,000 titles which includes a wide range of reference works and current periodicals. Also provided are computer facilities linked with those of the University and staffed by approximately a dozen computer programmers. They serve the needs of in-house researchers and users of the National Longitudinal Survey tapes.

For more information on specific Center activities or for a copy of the Publications List, write: Director, Center for Human Resource Research, Suite 585, 1375 Perry Street, Columbus, Ohio 43201.